SANDIA REPORT
SAND2006-4506P
Unlimited Release
Printed September 2006

Calendar Year 2005

Annual Site Environmental Report for Sandia National Laboratories, New Mexico

Katrina Wagner, Susan Koss, Stephanie Salinas and Teresa Goering

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under Contract DE-AC04-94Al85000.

Sandia National Laboratories

National Nuclear Security Administration

Issued by Sandia National Laboratories, operated for the United States Department of Energy by Sandia Corporation.

Available to DOE and DOE contractors from
U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831

Telephone: (865)576-8401
Facsimile: (865)576-5728
E-Mail: reports@adonis.osti.gov
Online ordering: http://www.osti.gov/bridge

Available to the public from
U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Telephone: (800)553-6847
Facsimile: (703)605-6900
E-Mail: orders@ntis.fedworld.gov
Online order: http://www.ntis.gov/ordering.htm

SAND2006-4506P
Unlimited Release
Printed September 2006

Calendar Year 2005 Annual Site Environmental Report

Sandia National Laboratories, Albuquerque, New Mexico

Project Lead
Stephanie Salinas

Associate Chief Editor and Document Specialist
Katrina Wagner

Graphics and Document Specialist
Susan Koss

Document Production Team
Teresa Goering

Produced by:
Sandia National Laboratories
P.O. Box 5800
Albuquerque, New Mexico 87185-1042

ABSTRACT

Sandia National Laboratories, New Mexico (SNL/NM) is a government-owned/contractor-operated laboratory. Sandia Corporation, a wholly-owned subsidiary of Lockheed Martin Corporation, manages and operates the laboratory for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Site Office (SSO) administers the contract and oversees contractor operations at the site. This annual report summarizes data and the compliance status of Sandia Corporation's environmental protection and monitoring programs through December 31, 2005. Major environmental programs include air quality, water quality, groundwater protection, terrestrial surveillance, waste management, pollution prevention (P2), environmental restoration (ER), oil and chemical spill prevention, and the National Environmental Policy Act (NEPA). Environmental monitoring and surveillance programs are required by DOE Order 450.1, *Environmental Protection Program* (DOE 2005) and DOE Order 231.1A, *Environment, Safety, and Health Reporting* (DOE 2004).

Calendar Year 2005 Annual Site Environmental Report
Sandia National Laboratories, Albuquerque, New Mexico
Final Approval date: August 2006

Work performed under Contract No. DE-ACO4-94AL85000

Prepared for:
U.S. Department of Energy, National Nuclear Security Administration,
Sandia Site Office, Albuquerque, New Mexico

Prepared by:
Sandia Corporation, Albuquerque, New Mexico
ES&H and Emergency Management Center

ACKNOWLEDGMENTS

We wish to thank the following individuals who contributed their time and expertise assisting in the production of this annual report.

Karen Agogino
Brenda Bailey-White
Linda Bayliss
Mendy Brown
Dave Castillo
Randy Castillo
Gina Deola
Michael du Mond
Leroy Duran
Joanna Eckstein
Dick Fate
Charles Fink
Teresa Goering
Tim Goering
Linda Gonzales
Susan Gorman
Joe Guerrero
Heidi Herrera
Tim Jackson
Adrian Jones
Susan Koss
Franz Lauffer
Margie Marley
Lucie Mayeux
Mark Miller
Jack Mizner
Fran Nimick
Stephanie Oborny
Jennifer Payne
Pamela Puissant
Anita Reiser
Chip Roma
Stephanie Salinas
Rebecca Sanchez
Mike Skelly
Richie Spangler
Chris Tolendino
Katrina Wagner
Nadine Williams

NOTE TO THE READER

The goals for the Annual Site Environmental Report are to present summary environmental data regarding environmental performance, compliance with environmental standards and requirements, and to highlight significant facility programs. In addition, the U.S. Department of Energy views this document as a valuable tool for maintaining a dialogue with our community about the environmental health of this site.

We are striving to improve the quality of the contents as well as include information that is important to you. Please provide feedback, comments, or questions to:

U.S. Department of Energy
National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, NM 87185-5400
Attention: Karen Agogino

This page intentionally left blank.

FIGURES

TABLES

This page intentionally left blank.

ACRONYMS AND ABBREVIATIONS

A	ABC/AQCB	Albuquerque-Bernalillo County/Air Quality Control Board
	ACRR	Annular Core Research Reactor
	ACE	Army Corps of Engineers
	AEA	Atomic Energy Act
	AFV	alternative fuel vehicles
	AHCF	Auxiliary Hot Cell Facility
	AIRFA	American Indian Religious Freedom Act
	ALARA	as low as reasonably achievable
	AMPF	Advanced Manufacturing Prototype Facility
	AMPL	Advanced Manufacturing Process Laboratory
	ANOVA	Analysis of Variance
	APPDL	Advanced Pulse Power Development Laboratory
	AQC	Air Quality Compliance
	ARCOC	Analysis Request and Chain-of-Custody
	ARPA	Archaeological Resources Protection Act
	ASER	Annual Site Environmental Report
	AST	above-ground storage tank
	AT&T	American Telephone and Telegraph Company
	AWN	Acid Waste Neutralization
B	BMP	Best Management Practice
	BTU	British Thermal Units
	BV	Background Volume
C	C&D	Construction and Demolition
	CA	Compliance Agreement
	CAA	Clean Air Act
	CAAA	Clean Air Act Amendments
	CAMU	Corrective Action Management Unit
	CAN	Clean Air Network
	CAP	Consolidated Audit Program
	CAP88	Clean Air Act Assessment Package-1988
	CCCL	Cleaning and Contamination Control Laboratory
	CEARP	Comprehensive Environmental Assessment and Response Program
	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
	CFR	Code of Federal Regulations
	CINT	Center for Integrated Nanotechnologies
	CMS	Corrective Measures Study
	CMI	Corrective Measures Implementation
	COC	Contaminants of Concern
	COD	Chemical Oxygen Demand
	COOC	Compliance Order on Consent
	CPMS	Criteria Pollutant Monitoring Station
	CPV	Compliance Plan Volume
	CSS	Sanitary Sewer Line
	CWA	Clean Water Act
	CWL	Chemical Waste Landfill
	CWP	corporate work process
	CY	Calendar Year
D	D&D	decontamination and demolition
	DCG	derived concentration guideline
	DoD	U.S. Department of Defense
	DOE	U.S. Department of Energy
	DQO	data quality objective
	DSS	Drain and Septic Systems

E	EA	Environmental Assessment
	ECF	Explosive Components Facility
	ECO	energy conservation opportunities
	EDE	effective dose equivalent
	EEANM	Environmental Education Association of New Mexico
	EID	Environmental Information Document
	EIS	Environmental Impact Statement
	EHD	Environmental Health Department
	EM	Environmental Management
	EMS	Environmental Management System
	EO	Executive Order
	EPA	U.S. Environmental Protection Agency
	EPCRA	Emergency Planning and Community Right-to-Know Act
	EPP	Environmentally Preferable Purchasing
	ER	Environmental Restoration
	ES&H	Environment, Safety, and Health
	ESA	Endangered Species Act
F	FFCA	Federal Facilities Compliance Act
	FFCO	Federal Facility Compliance Order
	FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
	FLAME	Fire Laboratory used for the Authentication of Modeling and Experiments
	FONSI	finding of no significant impact
	FY	Fiscal Year
G	GEL	General Engineering Laboratories
	GIF	Gamma Irradiation Facility
	GPP	General Plant Projects
	GSA	General Services Administration
	GWPP	Groundwater Protection Program
H	HAP	hazardous air pollutant
	HAZWOPER	Hazardous Waste Operations and Emergency Response
	HBWSF	High-Bay Waste Storage Facility
	HCF	Hot Cell Facility
	HE	high explosives
	HERMES-III	High Energy Radiation Megavolt Electron Source-III
	HLW	high-level radioactive waste
	HSWA	Hazardous and Solid Waste Amendments
	HWB	Hazardous Waste Bureau
	HWMF	Hazardous Waste Management Facility
I	ICM	Interim Corrective Measure
	IGPP	Institutional General Plant Projects
	ILMS	Integrated Laboratory Management System
	IRP	Installation Restoration Program
	ISMS	Integrated Safety Management System
J	JCEL	Joint Computational Engineering Laboratory
	JIT	Just-In-Time
K	KAFB	Kirtland Air Force Base
	KTF	Kauai Test Facility
L	LANL	Los Alamos National Laboratory
	LCBS	Lurance Canyon Burn Site
	LDR	Land Disposal Restrictions
	LE	Landfill Excavation

	LECS	Liquid Effluent Control System
	LEED	Leadership in Energy and Environmental Design
	LLW	low-level waste
	LTES	Long-Term Environmental Stewardship
	LTS	Long-Term Stewardship
	LTTD	Low-Temperature Thermal Desorption
	LWDS	Liquid Waste Disposal System
M	MAC	maximum allowable concentration
	MAPEP	Mixed Analyte Performance Evaluation Program
	MBTA	Migratory Bird Treaty Act
	MCL	maximum contaminant level
	MDA	minimum detectable activities
	MDL	minimum detection limit
	MDL	Microelectronics Development Laboratory
	MEI	maximally exposed individual
	MESA	Microsystems and Engineering Sciences Application
	MIPP	Medical Isotope Production Project
	MNA	monitored natural attenuation
	MOC	Management and Operating Contract
	MP	monitoring point
	MSB	Manzano storage bunkers
	MSDS	Material Safety Data Sheet
	MW	mixed waste
	MWL	Mixed Waste Landfill
N	N/A	not available or not applicable
	NAAQS	National Ambient Air Quality Standards
	NARAC	National Atmospheric Release Advisory Center
	NEPA	National Environmental Policy Act
	NESHAP	National Emission Standards for Hazardous Air Pollutants
	NFA	No Further Action
	NGF	Neutron Generator Facility
	NGPF	Neutron Generator Production Facility
	NHPA	National Historic Preservation Act
	NISAC	National Infrastructure Simulation and Analysis Center
	NMAC	New Mexico Administrative Code
	NMSA	New Mexico Statutes Annotated
	NMAAQS	New Mexico Ambient Air Quality Standards
	NMED	New Mexico Environment Department
	NMHWA	New Mexico Hazardous Waste Act
	NMWQCC	New Mexico Water Quality Control Commission
	NNSA	National Nuclear Security Administration
	NOV	Notice of Violation
	NPDES	National Pollutant Discharge Elimination System
	NPL	National Priorities List
	NPN	nitrate plus nitrite
	NRC	U.S. National Response Center
	NRC	U.S. Nuclear Regulatory Commission
	NSPS	New Source Performance Standards
	NWS	National Weather Service
O	ODS	Ozone-depleting substance
	OR	Occurrence Reporting
	ORPS	Occurrence Reporting Processing System
P	P2	Pollution Prevention
	PA/SI	Preliminary Assessment/Site Inspection

	PCB	polychlorinated biphenyl
	PCCP/PA	Post-Closure Care Plan/Permit Application
	PEP	Performance Evaluation Plan
	PER	Performance Evaluation Report
	PETL	Processing and Environmental Technology Laboratory
	pH	potential of Hydrogen
	PM	particulate matter
	PM_{10}	respirable particulate matter (diameter equal to or less than 10 microns)
	$PM_{2.5}$	respirable particulate matter (diameter equal to or less than 2.5 microns)
	POTW	Publicly-owned Treatment Works
	PPOA	Pollution Prevention Opportunity Assessment
	PQL	Practical quantitation limit
	PSL	Primary Subliner
	PVC	polyvinylchloride
Q	QA	quality assurance
	QAP	Quality Assurance Program
	QAPP	Quality Assurance Project Plan
	QC	quality control
	QNR	Qualified NEPA Reviewers
	QSAS	Quality Systems Analytical Services
R	RAP	Remedial Action Proposal
	RCRA	Resource Conservation and Recovery Act
	R&D	research and development
	RFP	Request for Proposals
	RHEPP	Repetitive High Energy Pulsed Power (an accelerator facility)
	RITS	Radiographic Integrated Test Stand
	RMMA	Radioactive Material Management Areas
	RMWMF	Radioactive and Mixed Waste Management Facility
	ROD	Record of Decision
	RPSD	Radiation Protection Sample Diagnostics
	RQ	reportable quantity
	RSI	Request for Supplemental Information
	RWNMDD	Radioactive Waste/Nuclear Material Disposition Department
S	SAP	Sampling and Analysis Plan
	SARA	Superfund Amendments and Reauthorization Act
	SD	sustainable design
	SDWA	Safe Drinking Water Act
	SGWS	shallow groundwater system
	SHPO	State Historic Preservation Officer
	SIC	Standard Industrial Classification
	SMO	Sample Management Office
	SNL/CA	Sandia National Laboratories, California
	SNL/NM	Sandia National Laboratories, New Mexico
	SOW	statement of work
	SPCC	Spill Prevention Control and Countermeasures (plan)
	SPHINX	Short Pulse High Intensity Nanosecond X-Radiator (an accelerator facility)
	SPR	Sandia Pulsed Reactor
	SSO	Sandia Site Operations
	ST	stabilization treatment
	START	Sandia Tomography and Radionuclide Transport Laboratory
	STP	Site Treatment Plan
	SURF	Sandia Underground Reactor Facility
	SUWCO	Sewer Use and Wastewater Control Ordinance
	SVOC	Semi Volatile Organic Compound

	SWEIS	Site-Wide Environmental Impact Statement
	SWMU	Solid Waste Management Unit
	SWP3	Storm Water Pollution Prevention Plan
	SWTF	Solid Waste Transfer Facility
T	TA	Technical Area
	TAG	Tijeras Arroyo Groundwater
	TAL	Target Analyte List
	TCE	trichloroethylene
	TDS	total dissolved solids
	TESLA	Tera-Electron Volt Energy Superconducting Linear Accelerator
	TLD	thermoluminescent dosimeter
	TLV	threshold limit value
	TNMHC	total non-methane hydrocarbon
	TOC	Total Organic Carbon
	TOMP	Toxic Organic Management Plans
	TOP	Technology and Operations Prototype
	TOX	total halogenated organics
	TRI	Toxic Release Inventory
	TRU	transuranic (radioactive waste)
	TSCA	Toxic Substances Control Act
	TSD	treatment, storage, and disposal
	TSS	total suspended solids
	TTF	Thermal Treatment Facility
	TTR	Tonopah Test Range
U	UAW	unaccounted for water
	UNM	University of New Mexico
	USAF	U.S. Air Force
	USDA	U.S. Department of Agriculture
	USFS	U.S. Forest Service
	USGBC	U.S Green Building Council
	USGS	U.S. Geological Survey
	UST	underground storage tank
V	VCA	Voluntary Corrective Action
	VCM	Voluntary Corrective Measure
	VOC	volatile organic compound
	VSA	Vertical Sensor Array
	VZMS	Vadose Zone Monitoring System
W	WERC	a consortium for environmental education and technology development established through a cooperative agreement with DOE
	WFO	work for others
	WIPP	Waste Isolation Pilot Plant
	WQG	Water Quality Group

UNITS OF MEASURE

°C	degree centigrade
cm	centimeter
°F	degrees Fahrenheit
fasl	feet above sea level
ft	feet
g	gram
gal	gallon
gpcd	gallons per capita per day

kg	kilogram
km	kilometer
kW	kilowatt
L	liter
lb	pound
mb	millibar
m/s	miles per second
mg	milligram
mph	miles per hour
ppbv	parts per billion by volume
ppm	parts per million
scf	standard cubic feet
tpy	tons per year
yr	year

RADIOACTIVITY MEASUREMENTS

rem	roentgen equivalent man	Sv	Sievert
mrem	millirem (unit of radiation dose)	Ci	curie
person-Sv	person-Sievert (unit of radiation dosage)	pCi	picocurie
person-rem	radiation dose to population (also man-rem)	µg	microgram
mSv	millisievert (unit of radiation dosage)	mR	milliroentgen
µR/hr	microroentgen per hour	Std Dev	standard deviation

APPROXIMATE CONVERSION FACTORS FOR SELECTED SI (METRIC) UNITS

Multiply SI (Metric) Unit	By	To Obtain U.S. Customary Unit
Cubic meters (m^3)	35.32	Cubic feet (ft^3)
Centimeters (cm)	0.39	Inches (in.)
Meters (m)	3.28	Feet (ft)
Kilometers (km)	0.61	Miles (mi)
Square kilometers (km^2)	0.39	Square miles (mi^2)
Hectares (ha)	2.47	Acres
Liters (L)	0.26	Gallons (gal)
Grams (g)	0.035	Ounces (oz)
Kilograms (kg)	2.20	Pounds (lb)
Micrograms per gram (mg/g)	1	Parts per million (ppm)
Milligrams per liter (mg/L)	1	Parts per million (ppm)
Celsius (°C)	°F = 9/5 °C+ 32	Fahrenheit (°F)
Sievert (Sv)	100	roentgen equivalent man (rem)

EXECUTIVE SUMMARY

Included are summaries of the following Environmental Programs in place at Sandia National Laboratories, New Mexico:

Waste Management and Pollution Prevention
Environmental Restoration Project
Terrestrial Surveillance
Water Quality
Groundwater Protection
Air Quality
National Environmental Policy Act Activities

Sandia National Laboratories, New Mexico (SNL/NM) is one of the nation's premier multi-program national security laboratories. SNL/NM is a government-owned/contractor-operated laboratory. Sandia Corporation, a wholly-owned subsidiary of Lockheed Martin Corporation, manages and operates the laboratory for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Site Office (SSO) administers the contract and oversees contractor operations at the site. This Annual Site Environmental Report (ASER) was prepared in accordance with and as required by DOE Order 450.1, Environmental Protection Program (DOE 2005) and DOE Order 231.1A, Environment, Safety, and Health Reporting (DOE 2004).

This ASER summarizes environmental protection, restoration, and monitoring programs in place at SNL/NM for Calendar Year (CY) 2005. It also discusses Sandia Corporation's compliance with environmental statutes, regulations, DOE Orders, permit provisions, and highlights significant environmental program efforts and accomplishments. This ASER is a key component of the DOE's effort to keep the public informed about environmental conditions throughout the DOE/NNSA's Nuclear Weapons Complex.

Environmental Programs

Sandia Corporation's strategy for managing and implementing its Environment, Safety, and Health (ES&H) Program is described in the Integrated Safety Management System (ISMS). The ISMS program is structured around five safety management functions and provides the processes to assist line management in identifying and controlling hazards. Sandia Corporation implemented an Environmental Management System (EMS) as an enhancement of the ISMS. The EMS is that part of the ISMS that addresses the environmental aspects and impacts of SNL/NM's activities, products, and services. In 2005, SNL/NM continued to work to improve environmental management (EM) based on best management practices (BMPs), bench marking, and process improvements. Further information about ISMS can be found in Chapter 8.

In 2005, Sandia Corporation declared to the DOE/NNSA/SSO that it had fully implemented an EMS in accordance with the requirements outlined in DOE Order 450.1. Sandia Corporation's EMS is the basis of our proactive approach to managing environmental risks and protecting the environment.

All 2005 program activities are performed continuously, but reported in this ASER on a CY basis, unless otherwise noted (programs based on the Fiscal Year (FY) run from October 1st through September 30th annually). The primary environmental programs in place at SNL/NM are summarized below.

Waste Management and Pollution Prevention (P2)

Waste at SNL/NM is processed at five facilities: the Hazardous Waste Management Facility (HWMF), the Thermal Treatment Facility (TTF), the Radioactive and Mixed Waste Management Facility (RMWMF), the Manzano Storage Bunkers (MSB), and the Solid Waste Transfer Facility (SWTF).

The focus of the P2 Program is to reduce resource use, generated waste, and enhance the overall efficiency of processes and organizations within SNL/NM. In 2005, SNL/NM received several awards for P2 accomplishments.

Environmental Restoration (ER) Project and Long-term Environmental Stewardship (LTES)

At the close of 2005, there were 110 regulated ER sites remaining to be completed at SNL/NM. In 2005, 21 sites were proposed for No Further Action (NFA). LTES at SNL/NM is defined as activities necessary to maintain long-term protection of human health, the environment, and natural and cultural resources from hazards associated with residual radioactive and hazardous contamination at former ER sites, including currently active sites. LTES activities have been increasing as the ER Project completion date of 2006 approaches. The ER Project is focusing on project closure, while also working with the SNL/NM EM Department on transitioning LTES activities to EM.

Terrestrial Surveillance

Soil, sediment, and vegetation are collected from on-site, perimeter, and off-site (community locations outside Kirtland Air Force Base [KAFB] boundaries) locations. The terrestrial surveillance sampling objectives are to detect any potential

releases or migration of contaminated material to off-site locations. In 2005, there were no terrestrial sample results that indicated concern that would trigger actions at locations that are not already being addressed by the ER Project.

In 2005, the only non-radiological samples collected were follow-up samples for lead in soils found at location 20. In lieu of routine sampling at all locations for non-radiological parameters, a summary report of all non-radiological results was prepared to serve as a baseline for future reference regarding non-radiological results in soils. In the future, routine sampling at the fixed locations outlined in this report will no longer be conducted, but rather sampling will be conducted in specific areas of interest with potential environmental impact.

Water Quality

- ***Wastewater*** – Wastewater from SNL/NM is discharged from five on-site outfalls permitted by the City of Albuquerque. Wastewater monitoring is conducted to ensure that all discharges meet the standards set by the City of Albuquerque's publicly-owned treatment works (POTW). All SNL/NM effluent discharge standards were within the City of Albuquerque's Sewer Use and Wastewater Control Ordinance (SUWCO) established limits during 2005. SNL/NM received five "Gold Pre-Treatment Awards" from the City of Albuquerque for the 2004-2005 reporting year.

- ***Surface Discharge*** – All water to be discharged to the ground surface, either directly or to lined containments, must meet State of New Mexico surface discharge standards. There were 17 requests made for individual discharges to the ground surface in 2005. All requests met the New Mexico Environment Department (NMED) New Mexico Water Quality Control Commission (NMWQCC) standards and were approved. Additionally, routine surface discharges are made to two evaporation lagoons servicing the Pulsed Power Facility under an existing discharge permit. All permit requirements for both lagoons were met in 2005. In 2005, there were four reportable surface releases reported to NMED. These reportable releases are documented in Section 2.2.2 and Section 6.2.2.

- ***Storm Water Runoff*** – In FY 2005, analytical monitoring was not required under SNL/NM's National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit for Storm Water Discharges Associated with Industrial Activities (Multi-Sector General). This NPDES permit requires quarterly analytical sampling be conducted in the second and fourth year of the five year permit, weather permitting. FY 2005 is the fifth year of the permit; therefore, analytical monitoring was not required. The permit also requires visual observations be performed every quarter. No visual observations were collected for the 2nd and 4th quarter of FY 2005 due to the lack of adequate runoff. For samples collected during the 1st and 3rd quarters of FY2005, no unusual characteristics were noted. The permit was due for renewal in FY 2005, but the U.S. Environmental Protection Agency (EPA) did not issue a new permit and extended the current permit into 2006.

- ***Oil Storage and Spill Control*** – A Spill Prevention Control and Countermeasures (SPCC) Plan is required under the Clean Water Act (CWA). Sandia Corporation's SPCC Plan describes oil storage facilities and the mitigation controls in place to prevent inadvertent discharges of oil. Facilities at SNL/NM subject to the regulations include oil storage tanks (underground storage tanks (USTs) and above ground storage tanks [ASTs]), bulk storage areas (multiple containers), and temporary or portable tanks. SNL/NM currently operates 51 ASTs. Two new 5,000 gallon ASTs were installed in 2005. One 25,000 gallon AST was closed.

Groundwater Protection

- ***Groundwater Protection Program (GWPP)*** – The GWPP conducts general surveillance of water quality from a network of wells not associated with the ER Project. Annual sampling was conducted in a total of 14 wells. Analysis was conducted for metals, volatile organic compounds (VOCs), inorganics (including nitrate and cyanide), phenolics, alkalinity, total halogenated organics (TOXs), gross alpha, gross beta, and selected radionuclides. All of the exceedances are attributed to naturally occurring sources.

- ***ER*** – The ER Project collects groundwater samples at five general project areas: the Chemical Waste Landfill (CWL), the Mixed Waste Landfill (MWL), Technical Area V (TA-V), Tijeras Arroyo Groundwater (TAG), and the Canyons Area. Water quality results reported by the ER Project were consistent with past years' results.

Air Quality

- ***Ambient Air Monitoring*** – Sandia Corporation measures ambient air quality at six locations throughout SNL/NM and compares results with National Ambient Air Quality Standards (NAAQS) and local ambient air standards. The network monitors criteria pollutants and VOCs. There were no gaseous pollutant exceedances in 2005.

- ***Air Quality Compliance*** – Air quality standards are implemented by regulations promulgated by local and federal governments in accordance with the Clean Air Act (CAA) and the CAA amendments (CAAA) of 1990. The Albuquerque/Bernalillo County Air Quality Control Board (ABC/AQCB), the State of New Mexico, and the EPA determine applicable air quality standards for non-radiological pollutants.

  In 2005, testing performed at the Steam Plant was incomplete as required in the New Source Review Synthetic Minor Air Emissions Permit #1705. The record keeping requirements were not being complied with. Corrective actions taken in response to the Notice of Violation (NOV) are summarized in Section 5.5.1 (Steam Plant).

- ***National Emission Standards for Hazardous Air Pollutants (NESHAP) Compliance*** – Subpart H of NESHAP regulates radionuclide air emissions from DOE/NNSA facilities with the exception of naturally-occurring radon. In 2005, there were 16 SNL/NM facilities reporting NESHAP-regulated emissions. Of these 16 sources, 15 were point sources and one was a diffuse source. In 2005, the primary radionuclides released were tritium and argon-41. In 2005, the on-site maximally exposed individual (MEI) was located on KAFB. The MEI dose of .00082 mrem/yr at the Kirtland Storage Facility resulted primarily from releases of argon-41 from the ACRR in nearby TA-V. The off-site MEI was located at the Eubank Gate Area. The MEI was 0.0001 mrem/yr. Both doses are below the EPA standard of 10 mrem/yr.

National Environmental Policy Act (NEPA) Activities

During 2005, the NEPA Team collected and compiled 2004 SNL/NM operations data for the selected facilities that were identified in the SNL/NM Site-Wide Environmental Impact Statement (SWEIS) as the major facilities with the greatest potential environmental impacts. These data and information were submitted to support the DOE/NNSA/SSO 5-year assessment of the SWEIS planned for compilation in 2006. Additionally, in 2005, the NEPA Team reviewed 1,118 proposed projects in the ISMS NEPA Module and transmitted 78 NEPA checklists to DOE/NNSA/SSO for review and determination.

chapter one

INTRODUCTION

In This Chapter ...

Sandia Corporation's History and Mission
Site Operations
Site Setting
Geology
Hydrological Setting
Regional Climate
Regional Ecology

Environmental Snapshot

Sandia Corporation is committed to saving 8 million gallons of water per year and in order meet this conservation goal, our Facilities Grounds and Roads Services installed a new computerized central irrigation control system in 2005.

This Annual Site Environmental Report (ASER) describes environmental protection programs currently in place at Sandia National Laboratories, New Mexico (SNL/NM). This report was prepared in accordance with the requirements set forth for all large U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) facilities and represents a key component of DOE's effort to keep the public informed about environmental conditions at DOE/NNSA sites. SNL/NM is owned by the DOE/NNSA.

SNL/NM is located on Kirtland Air Force Base (KAFB) in Albuquerque, New Mexico. The regional setting of SNL/NM provides a diverse range of geological, hydrological, climatic, and ecological settings. The Sandia Mountains, named for the watermelon color seen on the mountains at sunset, and the Manzanita Mountains both provide a beautiful setting at SNL/NM.

Sandia Corporation (a wholly-owned subsidiary of Lockheed Martin Corporation) continues to provide technological innovations since its inception in 1945. Most of SNL/NM's activities are conducted within five technical areas (TAs) and several remote locations.

In support of Sandia Corporation's mission, Environment, Safety, and Health (ES&H) issues are addressed through environmental management (EM) programs. These programs include effluent monitoring, environmental surveillance, environmental restoration (ER), pollution prevention (P2), chemical inventory management, oil spill prevention, and quality assurance (QA).

General Site Location and Characteristics

KAFB is a 51,559-acre military installation, including 20,486 acres withdrawn from the Cibola National Forest through an agreement with the U.S. Forest Service (USFS) (Figure 1-1) located at the foot of the Manzanita Mountains, with a mean elevation of 5,384 feet and a maximum of 7,986 feet. KAFB and SNL/NM are located adjacent to the City of Albuquerque, which surrounds KAFB on the north, northeast, west, and southwest boundaries.

KAFB is host to over 150 tenant groups at this site. SNL/NM is located on the east side of KAFB. The total area of DOE/NNSA-owned property that is dedicated to SNL/NM facilities and operations is approximately 8,585 acres. Of these, Sandia Corporation conducts its operations within 2,841 acres. An additional 5,817 acres in remote areas are provided to DOE through land-use agreements with the U.S. Air Force (USAF) and Isleta Pueblo. There are an additional 9,000 acres of buffer zone near the southwest boundary of KAFB. The buffer zone, leased from the State of New Mexico and Isleta Pueblo, provides margins of safety and sound buffers for SNL/NM testing activities. The ownership of the land is divided between the Isleta Pueblo and the State of New Mexico. Additional information on local geology, hydrology, and ecology is presented at the end of this chapter.

Operations Contract

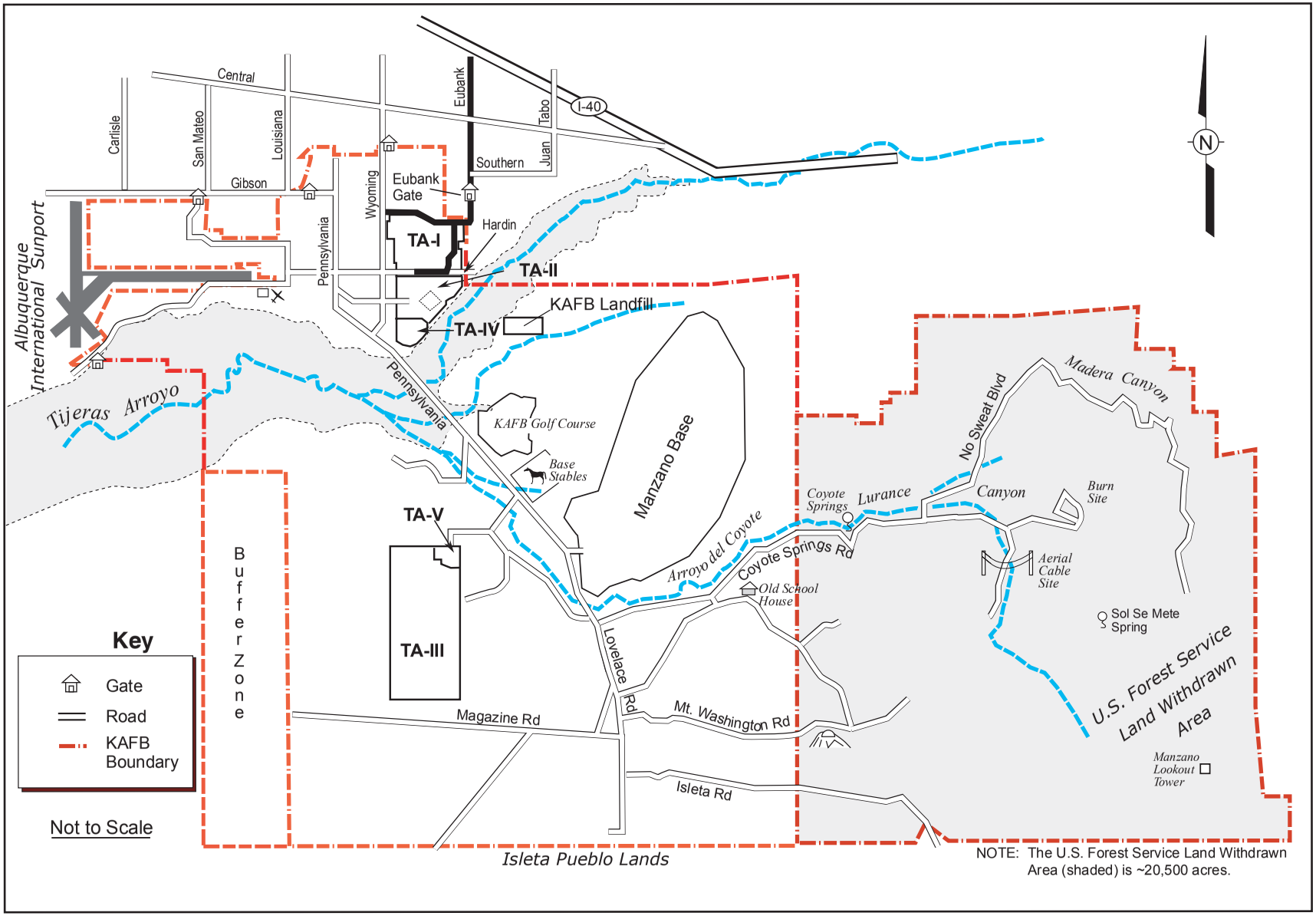
Sandia Corporation, like all regulated industries, complies with specific environmental regulations promulgated by local, state, and federal agencies. The Management and Operating Contract (MOC) between Sandia Corporation and DOE defines the primary contractual obligations for operating SNL/NM. This contract also drives Sandia Corporation's ES&H standards and requirements. Additionally, as stated in the MOC, Sandia Corporation must comply with DOE directives that establish specific requirements for environmental programs. There are six primary DOE directives currently on the contract baseline that pertain to the environmental protection and management:

- DOE Order 450.1, *Environmental Protection Program* (DOE 2005);
- DOE Order 231.1A, *Environment, Safety, and Health Reporting* (DOE 2004);
- DOE Order 231.1-2, *Occurrence Reporting and Processing of Operations Information* (DOE 2003);
- DOE Order 435.1, Chg 1, *Radioactive Waste Management* (DOE 2001);
- DOE Order 5400.5, Chg 2, *Radiation Protection of the Public and the Environment* (DOE 1993a); and
- SEN-22-90, *DOE Policy on Signatures of RCRA Permit Applications* (DOE 1990).

1.1 SANDIA CORPORATION'S HISTORY AND MISSION

History

SNL/NM got its start in 1945 as part of the Manhattan Project, which produced the first nuclear weapon. In 1949, President Harry Truman wrote American Telephone & Telegraph (AT&T) Corporation offering the company *"an opportunity to render an exceptional service in the national interest"* by managing Sandia Corporation. AT&T managed



02 _1-1.ai

FIGURE 1-1. SNL/NM Technical Areas and the U.S. Forest Service Land Withdrawn Area

Sandia Corporation for 44 years. Today, Sandia Corporation is managed by Lockheed Martin Corporation for the DOE/NNSA.

Mission
Sandia Corporation's enduring mission is to provide science and engineering support for the nuclear weapons stockpile. Today, the mission includes other aspects of national security, such as preventing the spread of nuclear, chemical, and biological weapons; developing technologies and strategies for responding to emerging threats such as terrorism; and preventing disruption of critical infrastructures such as energy supply and financial networks. Sandia Corporation collaborates with industry, universities, and other government agencies to commercialize new technologies. Recent technologies developed at SNL/NM can be found at the following website:

http://www.sandia.gov/LabNews

Managing a Legacy of Contamination
In a ranking of DOE sites, SNL/NM was one of the least contaminated facilities. The cleanup and remediation of all SNL/NM sites is expected to be complete by 2007. Some sites will require long-term monitoring to ensure that any remaining contamination does not migrate from the site. Detailed information about EM cleanup efforts throughout DOE can be found at DOE's website as well as the long-term environmental stewardship (LTES) website:

http://www.em.doe.gov/index4.html

http://www.sandia.gov/ltes/

A History of Progress
Sandia Corporation has made tremendous progress in building a comprehensive ES&H Program. The ES&H Manual (SNL 2006a), a dynamic online resource available to all personnel at SNL/NM, clearly describes ES&H requirements for all levels of work conducted. Improved waste management practices have been implemented and state-of-the-art waste handling facilities have been constructed to handle and properly dispose of hazardous, radioactive, and solid waste. Recycling programs, P2, and other waste minimization practices have been very successful at SNL/NM. Several audits have been conducted in recent years by the U.S. Environmental Protection Agency (EPA), various DOE/NNSA offices, the City of Albuquerque, and the State of New Mexico. The results of these audits, as well as SNL/NM internal audits support the commitment of SNL/NM in the area of ES&H.

Sandia Corporation's strategy for managing and implementing its ES&H Program is described in the Integrated Safety Management System (ISMS). The ISMS Program is structured around five safety management functions: (1) plan work, (2) analyze hazards, (3) control hazards, (4) perform work, and (5) feedback and improvement. ISMS provides the processes to assist line management in identifying and controlling hazards. For further information on audits and appraisals, see Section 2-11.

Environmental Management System (EMS)
Sandia Corporation implemented an EMS as an improvement of the environmental elements of ISMS. It serves as the basis to manage environmental compliance, controls, and improvements. Additionally, P2 goals were incorporated into the EMS. This strategy ensures that ES&H considerations are incorporated into each element of all work processes being conducted at Sandia Corporation. For further information on EMS, see Section 3-1.

1.2 SITE OPERATIONS

Technical Area I (TA-I)
TA-I is the focus of SNL/NM's operations, housing the main administrative center and a close grouping of laboratories and offices. A majority of activities performed in TA-I are dedicated to the design and research and development (R&D) of weapon systems, the limited production of weapon system components, and energy research programs. Facilities in TA-I include the main technical library, several assembly/manufacturing areas, the Steam Plant, and various laboratories such as the Advanced Manufacturing Processes Laboratory (AMPL), the Microelectronics Development Laboratory (MDL), the Neutron Generator Production Facility (NGPF), the Processing and Environmental Technology Laboratory (PETL), and the Joint Computational Engineering Laboratory (JCEL). The Microsystems and Engineering Sciences Applications (MESA) Complex is currently under construction, with an expected completion by mid-2006, and full operational capabilities in place by the end of 2007.

Technical Area II (TA-II)
TA-II includes facilities and lands south of the TA-I boundary at Hardin Blvd and extends to the northern boundary of TA-IV. The Explosive Components Facility (ECF), the Hazardous Waste Management Facility (HWMF), the Facilities Command Center, the Solid Waste Transfer Facility (SWTF), and the Construction and Demolition (C&D) Recycle Center are within TA-II.

Technical Area III (TA-III)
TA-III is the largest and most remote area of all the TAs, and is characterized by facilities separated by extensive, undeveloped areas. TA-III is used to accommodate large-scale engineering test activities requiring large safety and/or security area buffers, such as sled tracks used for collision testing, centrifuges, and the Thermal Test Complex, completed in 2005. Other facilities include the Radioactive and Mixed Waste Management Facility (RMWMF), the Mixed Waste Landfill (MWL), and the Corrective Action Management Unit (CAMU).

Technical Area IV (TA-IV)
TA-IV, located south of TA-II, houses facilities used to conduct R&D activities in inertial-confinement fusion, pulsed power, and nuclear particle acceleration. Accelerators located in TA-IV include the Z Accelerator, the Advanced Pulsed-Power Development Laboratory (APPDL), the Radiographic Integrated Test Stand (RITS), the Tera-Electron Volt Energy Superconducting Linear Accelerator (TESLA), the High Energy Radiation Megavolt Electron Source III (HERMES III), the Saturn Accelerator, the Repetitive High Energy Pulsed Power I (RHEPP I) Accelerator, the High Power Microwave Laboratory, and the Short-Pulse High Intensity Nanosecond X-Radiator (SPHINX).

Technical Area V (TA-V)
TA-V, located adjacent to the northeast corner of TA-III, includes facilities that routinely handle radioactive materials used in experimental research and defense programs. TA-V houses the Sandia Pulsed Reactor (SPR), the Gamma Irradiation Facility (GIF), the Annular Core Research Reactor (ACRR), the Hot Cell Facility (HCF), and the Auxiliary Hot Cell Facility (AHCF).

Remote Test Areas
Several remote test areas are located east and southeast of TA-III and within the canyons and foothills of the USFS withdrawn area (e.g., Lurance Canyon and Coyote Canyon). These areas are used for explosive ordnance testing, rocket firing experiments, and open burn thermal tests.

Facilities Outside KAFB Boundaries
Facilities that are or will be utilized by SNL/NM personnel, but are outside the boundaries of KAFB, include the Center for Integrated Nanotechnologies (CINT) to become operational in 2006; the MESA Technology and Operations Prototype (TOP), and the International Programs Building. All are located in the Sandia Science and Technology Park along Eubank Boulevard.

1.3 SITE SETTING

Regional Topography and Layout
KAFB has widely varied topography from rugged mountains on the east to nearly flat plains on the west. As shown in Figure 1-1, the land withdrawn area backs up to and encompasses a portion of the Manzanita Mountains within the Cibola National Forest. The remainder of KAFB, with the exception of Manzano Base, is situated on gently west-sloping foothill terrain that grades to widespread flat areas where the majority of USAF and SNL/NM facilities are located.

The Mountains
The most prominent topographic feature in the Albuquerque area is the impressive west face of the Sandia Mountains. The Sandia Mountains form a 13-mile long escarpment distinguished by steep cliffs, pinnacles, and narrow canyons. Sandia Crest at 10,678 feet is the highest point in the region. Tijeras Canyon divides the Sandia Mountains to the north from the Manzanita and Manzano Mountains to the south. Sediments transported from the canyons and draws of these mountains have formed coalescing alluvial fans called bajadas. These broad alluvial plains slope west across KAFB and are dissected by the Tijeras Arroyo, smaller arroyos, and washes.

Tijeras Arroyo
Tijeras Arroyo is 4,265 feet wide and 108 feet deep, forming a significant topographic feature across KAFB. The watershed drained by Tijeras Arroyo includes the southern Sandia Mountains, the Manzanita Mountains, and the north end of the Manzano Mountains. The arroyo is dry except during heavy downpours, which can cause significant flash floods. The arroyo originates out of Tijeras Canyon and runs coincident with the Tijeras fault for several miles before deviating to the southwest, where it discharges to the Rio Grande about eight miles from the KAFB west boundary. Today, water from the Rio Grande is primarily used for agricultural irrigation. Construction is currently underway to build a water treatment plant that will use water from the river to supplement Albuquerque's drinking water supply.

Counties and Population
New Mexico is the fifth largest state in the U.S. with 121,666 square miles in area and a total population of approximately 1.93 million. A recent count of the population within an 80-kilometer (50-mile) radius of SNL/NM was 854,211 residents (DOC 2006). The Albuquerque metropolitan area alone has approximately 723,296 residents (DOC 2006). There are nine counties contained in all or part of this radius (Figure 1-2).

1.4 GEOLOGY

1.4.1 Regional Setting

The regional geologic setting in which SNL/NM and KAFB are situated has been subjected to relatively recent episodes of basaltic volcanism and ongoing regional rifting (crustal extension). The Rio Grande rift has formed a series of connected down-dropped basins in which vast amounts of sediments have been deposited. The Rio Grande rift extends for about 450 miles from Leadville, Colorado to northern New Mexico.

1.4.2 Albuquerque Basin

The Albuquerque Basin is one of several north-south trending sediment-filled basins formed by the Rio Grande rift. This major structural feature is approximately 30 miles wide and 100 miles long and 3,000 square miles in area (Grant 1982). On the east, uplifted fault blocks, manifested by the Sandia, Manzanita, and Manzano Mountains bound the basin. The western side of the basin is bound by the Lucero uplift to the south, the Rio Puerco fault belt, and the Nacimiento uplift at the northern end. There is relatively little topographic relief along the Rio Puerco fault belt on the northwestern side of the basin. Two south-flowing rivers drain the basin: the Rio Puerco to the west and the Rio Grande to the east.

Regional Fault Systems

As shown in Figure 1-3, several major faults are located on KAFB. The Tijeras fault, which has been traced as far north as Madrid, New Mexico, trends southwesterly through Tijeras Canyon and across KAFB. The Tijeras Canyon was formed by preferential erosion along the fault. The system of faults connecting with the Tijeras fault on KAFB is collectively referred to as the Tijeras fault complex. The Tijeras fault complex marks a distinct geologic boundary between the uplifted blocks on the east and the sediment-filled basin to the west. This geologic boundary also forms a boundary between the two major groundwater regimes at KAFB.

The Sandia fault is thought to be the primary boundary between the Sandia Mountains and the Albuquerque Basin. The Sandia fault converges with the Tijeras fault and the Hubbell Springs fault. Both the Sandia fault and Hubbell Springs fault are north-south trending, down-to-the-west, en-echelon normal faults, which are Tertiary in age (Lozinsky et al. 1991; Woodward 1982; Kelley 1977).

1.5 HYDROLOGICAL SETTING

The hydrogeological system is divided into two areas separated by the Tijeras fault complex, which marks a distinct geological boundary. To the east of the Tijeras fault complex, the geology is characterized by fractured and faulted bedrock covered by a thin layer of alluvium and shallow groundwater 49 to 98 feet deep. On the west side of the Tijeras fault complex within the basin, groundwater levels occur from 295 to 492 feet below the surface.

A shallow groundwater system (SGWS) overlies the regional system in the north portion of KAFB. The SGWS extends southward from TA-I to the KAFB Golf Course. The western extent of the SGWS is somewhere midway between Wyoming Boulevard and the Albuquerque Sunport east-west runway. The eastern extent is just east of the KAFB landfill and may be bounded by the West Sandia Fault. The groundwater gradient within the SGWS is to the southeast with the depth to water approximately 270 feet below ground level in the western part and 420 feet to groundwater in the east.

Natural Springs

There are two perennial springs present on KAFB: Coyote Springs and Sol Se Mete Spring. Additionally, there is one perennial spring (Hubbell Spring) located immediately south of the KAFB boundary on Isleta Pueblo. Numerous ephemeral springs occur within the foothills and in the eastern reach of Arroyo del Coyote.

Groundwater Production

The primary regional aquifer in the basin is within the upper unit and, to a lesser degree, the middle unit of the Santa Fe Group. Most of the City of Albuquerque's water supply wells are located on the east side of the Rio Grande. The highest yield wells are screened in the sediments associated with the ancestral river channel. Prior to extensive urban development in the Albuquerque area beginning in the 1950s, the direction of regional groundwater flow was primarily to the southwest. As a result of groundwater withdrawal, the water table has dropped by as much as 141 feet (Thorn et al. 1993). Groundwater withdrawal from KAFB and City of Albuquerque wells at the north end of KAFB has created a trough-like depression in the water table causing flow to be diverted northeast in the direction of the well fields.

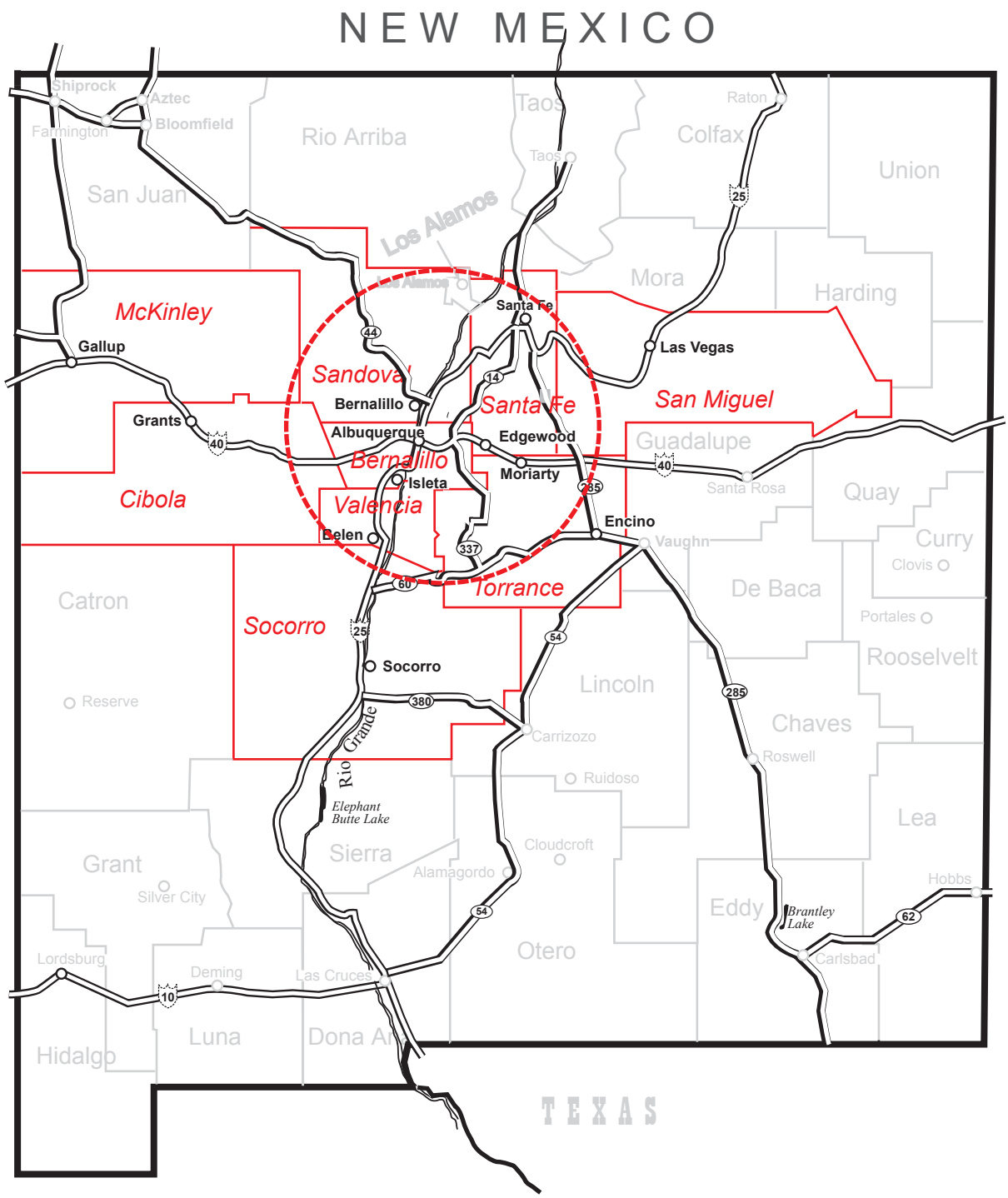


FIGURE 1-2. State of New Mexico Map
The overlay shows major roads, cities, county lines, and the 50-mi radius from SNL/NM facilities (dashed circle).

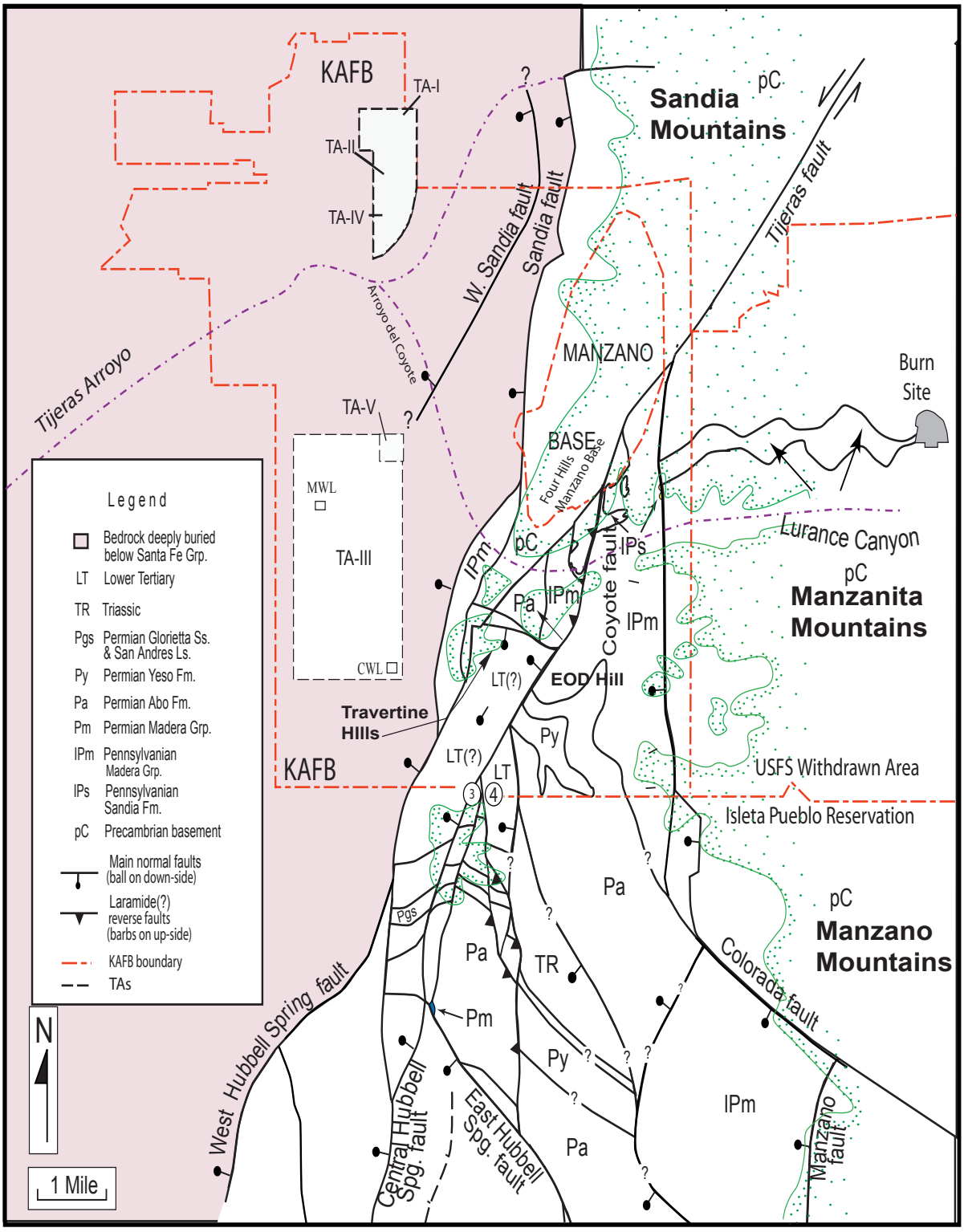


FIGURE 1-3. Generalized Geology in the Vicinity of SNL/KAFB

1.6 REGIONAL CLIMATE

Large diurnal temperature ranges, summer monsoons, and frequent drying winds are characteristic of the regional climate in the Albuquerque Basin and Sandia and Manzano Mountains.

Temperatures are typical of mid-latitude dry continental climates with summer high temperatures in the basin in the 90s F and winter high temperatures around 50 F. Daily low temperatures range from around 60s in the summer to the low 20s in the winter. The dry continental climate also produces low average humidities in the late spring and summer prior to the onset of the monsoon season. Daytime relative humidities can be between 10 and 20 percent in the spring and early summer, with an average humidity near 30 percent. Average winter relative humidities are in the 50s.

Precipitation varies across the region with many locations in the higher elevations of the mountains receiving twice the annual rainfall of locations in the Albuquerque Basin. Most precipitation falls between July and October, and mainly in the form of brief heavy rain showers. Average annual precipitation based on 10 years of data collected between 1995 and 2004 is around 8.5 inches at SNL/NM with 10.9 inches in the lower foothills. Annual precipitation recorded at the National Weather Service (NWS) cooperative stations in mountain elevations varies between 10 and 23 inches. The winter season in the Albuquerque Basin and around SNL/NM is generally dry with an average of less than 1.5 inches of precipitation falling between December and February.

While the regional climate is described by the atmospheric state variables of temperature and humidity, site-specific meteorology at SNL/NM is influenced by the proximity to topographic features such as mountains, canyons, and arroyos. These features influence local wind patterns across the site; canyons and arroyos tend to channel or funnel wind, whereas mountains create an upslope-downslope diurnal pattern to wind flows. Winds tend to blow toward the mountains or up the Rio Grande Valley during the day and nocturnal winds tend to blow down the mountain towards the Rio Grande Valley. These topographically induced wind flows can be enhanced or negated by weather systems that move across the southwest part of the U.S. The strongest winds occur in the spring when monthly wind speeds average 10.3 miles per hour. Wind gusts can commonly reach 50 miles per hour.

1.7 REGIONAL ECOLOGY

The SNL/NM facilities area is influenced by two major physiographic provinces:

Mesa and Plains – much of central New Mexico, including the middle Rio Grande and much of SNL/NM, is comprised of this physiography. Major landforms are valleys, lowlands, outwash plains, and alluvial fans and terraces. Grama and galleta grasses and four-wing saltbush occur along with sand sage at lower elevations, pinon-juniper at higher elevations, and conifers are in the scattered mountain ranges. Riparian strips along water courses have cottonwood-willow and non-native salt cedar.

Southern Rocky Mountains – the Sandia and Manzano Mountains form the southern extension of the Rocky Mountains. The eastern portion of SNL/NM is located in, and bordered by the Manzanos. Vegetation in these steep, rugged mountains varies greatly on the basis of elevation and aspect. Due to topography, weather, fire, insect outbreaks, and disease, forests in the Southern Rocky Mountains tend to be patchy. The landscape is a complex mosaic of open meadows and forest stands of varying age and species composition.

These physiographic provinces each have an influence on the typical landforms, flora, and fauna predominant within the SNL/NM area. The topography at KAFB ranges from lowland grasslands to high elevation coniferous forests. With much of the area undeveloped, there is great diversity in plant and animal communities living on KAFB. At least 267 plant species and 195 animal species occur on KAFB (DOE 1999a). Table 1-1 lists the most common species of birds, mammals, reptiles, amphibians, and plants that have been identified on-site.

1.7.1 Regional Life Zones Occurring on KAFB

Ponderosa Pine Forest or Transition Life Zone (7,000 – 8,000 feet) A closed canopy of ponderosa pines, pinon-pine, juniper, scrub oak, grassy meadows, streams, marshes and canyons are typical of this zone. The Forest Service withdrawn area in the eastern portion of KAFB reaches an elevation of just over 7,900 feet. (Section 1.7.1 continues on Page 1-12.)

Beneficial *landscaping at Sandia*

Reducing Our Use

In the arid southwest water is a precious natural resource. Sandia Corporation recognizes the need to protect our natural resources and values the importance of being a good corporate citizen. Consequently, Sandia Corporation has actively pursued a goal of reducing water use. Several methods have been implemented to reduce water waste in our landscaping practices.

Innovative approaches, educational programs, and the employment of sustainable design principles in new construction have changed SNL/NM's landscape practices. The redesign of SNL/NM's landscaping began as an initiative to maintain a campus-like atmosphere for all to enjoy while working towards reducing water use, costs, and waste. As a result, our site's appearance has been enhanced, and we are saving money. An educated landscaping team and a state of-the-art computerized irrigation system are proving to be worthwhile investments in the future.

Master Gardeners, Master Results

Members of SNL/NM's Grounds and Roads Services Team are required to become certified as a master gardener. Each team member takes 64 hours of master gardening classes available in Albuquerque. The coursework provides instruction on a variety of topics including xeriscape planning, tree planting, and irrigating. Team members also attend an annual tree conference to continuously increase professional development.

In the past, trees and other landscaping vegetation around new buildings were selected by the building contractors and drought-tolerance was typically not a consideration. Today, teaming with Facilities' architectural engineers, the master gardeners assist in the landscaping selection process. The master gardener education program provides the team with the knowledge necessary to make recommendations to the SNL/NM Engineering Department as to native and drought tolerant vegetation that should be planted around new buildings.

Xeriscaping at SNL/NM

The master gardeners know the types of trees that thrive in Albuquerque, a region 7 and 7A planting zone. Selecting plants that are suitable to an arid climate has increased the survival rate thereby minimizing replanting time and forgoing the cost of replacement plants, while reducing the quantity of water needed to maintain a healthy landscape.

Intelligent
Irrigation at Sandia

SNL/NM has been irrigating 320 acres of landscaped area using a system composed of 61 miles of irrigation piping that requires maintenance. As new buildings are completed, this system will eventually cover 500 acres. Sandia Corporation is committed to saving 8 million gallons of water per year and in order meet this conservation goal, our Facilities Grounds and Roads Services installed a new computerized central irrigation control system.

This new water use management tool is designed to minimize unnecessary watering and operates in non-standard hours to minimize evaporation due to direct sunlight. It measures wind and humidity. In times of high winds, the system stops irrigation until the wind reduces to three miles per hour. When it senses rain, the system automatically delays watering.

The computerized central irrigation control system monitors and displays system operating problems. This system can detect a leak, such as a broken sprinkler head, within the first two minutes and within thirty seconds of detection the system automatically shuts down. Prior to installing this central irrigation control system, when a leak developed the irrigation system would continue to water until the leak was observed, reported, and manually shut off. It could take two to three weeks to troubleshoot a leak if it was not identified and reported by an individual. An undetected leak wasted water at the rates of 40 to 200 gallons per minute. The return on investment for this new irrigation system is three years, but the best return for SNL/NM and our neighbors is that water is not being wasted.

Native, drought-tolerant plantings, light colored pavers and stormwater collection are key features of this attractive low water use landscape.

Xeriscaping at SNL/NM

Why Xeriscape at Home?

Xeriscaping Saves Water:

Using native and other drought-tolerant plants can significantly reduce water use.

Xeriscaping Saves Time:

It de-emphasizes the use of bluegrass lawns and other thirsty plants. This common-sense approach can reduce the time you spend watering, fertilizing and mowing.

Xeriscaping Saves Money:

Reducing water use can lower your water bill. Xeriscaping can also reduce maintenance costs and increase the beauty and value of your property.

Are you interested in learning more about xeriscaping your yard? Visit the following site for a comprehensive list on New Mexico friendly plants, city rebate information, and even free xeric design templates:

http://www.cabq.gov/waterconservation/xeric.html

Xeriscape information courtesy of the City of Albuquerque website (http://www.cabq.gov).

Pinon-Juniper Woodland Zone (6,000 – 7,000 feet) A mostly open canopy of pinon-pine and juniper dot this zone of foothills and mesas. Animals typical of this woodland include the pinon mouse and pinon jay. Much of the rolling terrain in the withdrawn area is comprised of this zone.

Upper Sonoran Life Zone (below 6,000 feet) This shortgrass prairie zone occurs on alluvial fans, mesas and gently rolling or sloping plains. Pioneer plants include tumbleweed, goathead, and spurge; intermediate plants include galleta and burro grass, cactus, and mixed weeds; climax vegetation is grama grass. Animals include prairie dogs, burrowing owls, and kangaroo rats. The non-withdrawn area of KAFB lands fall within this zone.

TABLE 1-1. Common Plants and Animals Identified at KAFB

BIRDS			
American robin	*Turdus migratorius*	Horned lark	*Eremophila alpestris*
American kestrel	*Falco sparverius*	Killdeer	*Charadrius vociferus*
Black-chinned hummingbird	*Archilochus alexandris*	Loggerhead shrike	*Lanius ludovicianus*
Black-headed grosbeak	*Pheucticus melanocephalus*	Mountain bluebird	*Sialia currucoides*
Broad-tailed hummingbird	*Selasphorus platycercus*	Red-tailed hawk	*Buteo jamaicensis*
Dark-eyed junco	*Junco hyemalis*	Rufous-sided towhee	*Pipiloerythro melanocephalus*
MAMMALS			
Black bear	*Ursus americanus*	Deer mouse	*Peromyscus maniculatus*
Bobcat	*Felis rufus*	Gunnison's prairie dog	*Cynomys gunnisoni*
Banner-tailed kangaroo rat	*Dipodomys spectabilis*	Gray fox	*Urocyon cinereoargenteus*
Black-tailed jackrabbit	*Lepus californicus*	Mule deer	*Odocoileus hemionus*
Desert cottontail	*Sylvilagus audubonii*		
REPTILES AND AMPHIBIANS			
Collared lizard	*Crotaphytus collaris*	Great plains skink	*Eumeces obsoletus*
Chihuahuan spotted whiptail	*Cnemidophorus exsanguis*	Great plains toad	*Bufo cognatus*
Desert horned lizard	*Phrynosoma platyrhinos*	Western diamondback rattlesnake	*Crotalus atrox*
Eastern fence lizard	*Sceloporus undulatus*	Side-blotched lizard	*Uta stansburiana*
Gopher snake	*Pituophis melanoleucus*	Short-horned lizard	*Phrynosoma douglassi*
PLANTS			
Apache plume	*Fallugia paradoxa*	Goathead	*Tribulus terrestris*
One-seed juniper	*Juniperus monosperma*	India ricegrass	*Achnatherum hymenoides*
New Mexico porcupine grass	*Stipa neomexicana*	Ring muhly	*Muhlenbergia torreyi*
Purple three-awn	*Aristida purpurea*	Bush muhly	*Muhlenbergia porteri*
Shrub live oak	*Quercus turbinella*	Soapweed yucca	*Yucca glauca*
Spectacle pod	*Ditheryrea wislizenii*	Blue locoweed	*Astragalus lentiginosus*

chapter two

COMPLIANCE SUMMARY

In This Chapter ...

Environmental Snapshot

The 2005 U.S. Department of Energy Performance Evaluation Report indicates Sandia Corporation's overall environmental score is good.

Sandia Corporation conducts operations based on environmental regulations, statutes, and U.S. Department of Energy (DOE) Orders. A variety of programs at Sandia National Laboratories, New Mexico (SNL/NM) work together to strive for 100 percent compliance with applicable regulations. As a part of these federal, state, and locally mandated regulations, SNL/NM adheres to strict reporting and permitting requirements.

This chapter summarizes Sandia Corporation's compliance status with major environmental regulations, statutes, and DOE Orders applicable to operations conducted at SNL/NM (see shaded box on page 2-4 and Section 2.1.16). Ongoing compliance issues and corrective actions, environmental occurrences, and environmental audits and appraisals are also discussed in this chapter.

Current permits held by Sandia Corporation and DOE, National Nuclear Security Administration (NNSA), Sandia Site Office (SSO) are listed in Chapter 9.

Compliance Order on Consent (COOC)
A COOC was agreed to by the New Mexico Environment Department (NMED), DOE and Sandia Corporation in 2004. The COOC provides corrective action requirements and establishes schedules and deliverables. The COOC is mandated under the New Mexico Hazardous Waste Act and New Mexico Solid Waste Act.

Compliance Agreement (CA)
A CA was signed by the City of Albuquerque and DOE in 2005. The CA provides corrective action requirements and established schedules and deliverables for Steam Plant testing and reporting. The CA is mandated by and through the Environmental Health Department (EHD), which is authorized by the City of Albuquerque, the County of Bernalillo, and the Albuquerque-Bernalillo County/Air Quality Control Board (ABC/AQCB).

2.1 COMPLIANCE STATUS WITH FEDERAL REGULATIONS

Most environmental regulations and statutes applicable to Sandia Corporation along with their websites are discussed on page 2-4.

2.1.1 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

CERCLA, commonly known as "Superfund," provides cleanup funds and/or assessment requirements for inactive waste sites at all federal facilities. A Preliminary Assessment/Site Inspection (PA/SI), as required by CERCLA, was performed at SNL/NM in 1988. This inspection confirmed that Sandia Corporation does not own any sites that would qualify for listing on the National Priorities List (NPL). The NPL lists the nation's high priority cleanup sites or "Superfund sites." Therefore, with respect to inactive hazardous waste sites, Sandia Corporation has no CERCLA reporting requirements. Other CERCLA reporting requirements may be invoked in the case of a reportable quantity (RQ) release. Sandia Corporation was in full compliance with CERCLA Superfund Amendments and Reauthorization Act (SARA), in 2005 (Table 2-6). Additional CERCLA reporting requirements defined under SARA Title III are discussed in the following section.

2.1.2 Emergency Planning and Community Right-to-Know Act (EPCRA)

EPCRA, also known as SARA Title III, establishes emergency planning requirements for federal, state, and local governments and industry.

EPCRA requires that the community be informed of potential hazards, such as the type and location of large quantities of toxic chemicals used and stored by facilities in the community. EPCRA specifically mandates that chemical information be made available to local emergency response organizations, such as fire departments and hospitals. Any inadvertent release must be reported to appropriate state and local authorities and all subsequent reports must be made accessible to the public. The four major reporting requirements designated by specific sections of SARA Title III (or EPCRA) are shown in Table 2-1.

Information on EPCRA can be found at the following U.S. Environmental Protection Agency (EPA) website:

http://yosemite.epa.gov/oswer/CeppoWeb.nsf/content/epcra_law.htm

TABLE 2-1. 2005 SARA Title III (or EPCRA) Reporting Requirements Applicable to SNL/NM

Section	SARA Title III Section Title	Requires Reporting?		Description
		Yes	No	
302 - 303	Emergency Planning	✓		Sandia Corporation submits an annual report listing chemical inventories above the reportable Threshold Planning Quantities listed in 40 CFR Part 355 Appendix B, location of the chemicals, and emergency contacts. The report is prepared for the DOE/ NNSA/SSO, which distributes it to the required entities.
304	Emergency Notification		✓	No RQ releases of an extremely hazardous substance, or as defined under CERCLA, occurred in 2005.
311-312	Hazardous Chemical Storage Reporting Requirements	✓		There are two "Community Right-to-Know" reporting requirements: (a) SNL/NM completes the EPA Tier II forms for all hazardous chemicals present at the facility at any one time in amounts equal to or greater than 10,000 pounds and for all extremely hazardous substances present at the facility in an amount greater than or equal to 500 lbs or the Threshold Planning Quantity, whichever is lower; (b) SNL/NM provides MSDSs for each chemical entry on a Tier II form unless it decides to comply with the EPA's alternative MSDS reporting, which is detailed in 40 CFR Part 370.21.
313	Toxic Chemical Release Forms	✓		For the first time since 1995, SNL/NM was above the reporting thresholds in 2005 for submitting a TRI Report for (lead only). The 2006 TRI Report submitted was for Calendar Year 2005.

NOTES: MSDS = Material Safety Data Sheets (gives relevant chemical information)
RQ = reportable quantity
TRI = Toxic Release Inventory
EPA = U.S. Environmental Protection Agency
SSO = Sandia Site Office
SARA = Superfund Amendments and Reauthorization Act
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
EPCRA = Emergency Planning and Community Right-to-Know Act
DOE = U.S. Department of Energy
NNSA = National Nuclear Security Administration
SNL/NM = Sandia National Laboratories, New Mexico
CFR = Code of Federal Regulations

Toxic Release Inventory (TRI) Reporting

EPCRA regulations require that facilities with activities described in the Standard Industrial Classification (SIC) Code 20 through 39 that use toxic chemicals listed in SARA Title III over a threshold value must submit a TRI report. A TRI report is also required by EO 13148, *Greening the Government Through Leadership in Environmental Management*. The threshold value for listed chemicals for which a TRI report is required is 10,000 lb/yr, unless otherwise specified.

Each year, nearly 23,000 facilities report to EPA under the TRI Program. The proposed TRI Reporting Forms Modification Rule (1674 Federal Register/Vol. 70, No.6/ Monday, January 10, 2005) sought comment on eliminating certain information from the reports, simplifying other reporting data, and in some cases, reducing duplicate data collection efforts. The options being proposed reduce the cost of compiling and submitting TRI reports, while maintaining the quality and practical utility of the TRI data. This rule became effective on September 12, 2005. The first reports with the revised reporting requirements will be due on or before July 1, 2006, for reporting year (i.e., calendar year) 2005. Over the next year, EPA anticipates proposing two rules to simplify TRI reporting requirements; this is the first.

In 2005, chemical use at SNL/NM was above the reporting thresholds for submitting a TRI report for lead, and Sandia Corporation continues to document its toxic chemical use in the *Chemical Inventory Report, Calendar Year 2005* (SNL/Outrider Corporation 2006), which lists all purchases of chemicals (even though the quantities are below the threshold quantities).

This chemical inventory supports compliance with SARA Title III as well as reporting for the City of Albuquerque inventory requirements.

Major Environmental Regulations & Statutes Applicable to SNL/NM

Atomic Energy Act (AEA)
Directs U.S. Department of Energy (DOE) and the U.S. Nuclear Regulatory Commission (NRC) in the management of nuclear materials and radioactive waste *http://www.eh.doe.gov/oepa/laws/aea.html*

Clean Air Act (CAA) and CAA Amendments (CAAA)
Provides standards to protect the nation's air quality *http://www.epa.gov/oar/oaq_caa.html*

Clean Water Act (CWA)
Provides general water quality standards to protect the nation's water sources and byways *http://www.epa.gov/region5/water/cwa.htm*

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
Provides federal funding for cleanup of inactive waste sites on the National Priorities List (NPL) and mandates requirements for reportable releases of hazardous substances *http://www.epa.gov/region5/defs/html/cercla.htm*

Cultural resources acts
Includes various acts that protect archeological, historical, religious sites, and resources *http://water.usgs.gov/eap/env_guide/cultural.html*

Endangered Species Act (ESA)
Provides special protection status for federally-listed endangered or threatened species *http://www.epa.gov/region5/defs/html/esa.htm*

Executive Orders (EOs)
Several EOs provide specific protection for wetlands, floodplains, environmental justice in minority and low-income populations, and greening the government through leadership in environmental management *http://www.archives.gov/federal-register/executive-orders/disposition.html*

Federal Facility Compliance Act (FFCA)
Directs federal agencies regarding environmental compliance *http://tis.eh.doe.gov/oepa/laws/ffca.html*

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
Controls the distribution and use of various pesticides *http://www.epa.gov/region5/defs/html/fifra.htm*

Migratory Bird Treaty Act (MBTA) of 1918
Prevents the taking, killing, possession, transportation and importation of migratory birds, their eggs, parts, and nests *http://tis.eh.doe.gov/oepa/laws/mbta.html*

National Emission Standards for Hazardous Air Pollutants (NESHAP)
Specifies standards for radionuclide air emissions and other hazardous air releases under the CAA *http://www.epa.gov/radiation/neshaps/*

National Environmental Policy Act (NEPA)
Requires federal agencies to review all proposed activities so as to include environmental aspects in agency decision-making *http://tis.eh.doe.gov/NEPA/*

Resource Conservation and Recovery Act (RCRA)
Mandates the management of solid and hazardous waste and certain materials stored in underground storage tanks (USTs) *http://www.epa.gov/region5/defs/html/rcra.htm*

Safe Drinking Water Act (SDWA)
Provides specific standards used for drinking water sources *http://www.epa.gov/safewater/sdwa/sdwa.html*

Superfund Amendments and Reauthorization Act (SARA)
SARA,Title III, also known as the Emergency Planning and Community-Right-to-Know Act (EPCRA), mandates comunication standards for hazardous materials over a threshold amount that are stored or used in a community ` *http://www.epa.gov/region5/defs/html/sara.htm*

Toxic Substance Control Act (TSCA)
Specifies rules for the manufacture, distribution, and disposal of specific toxic materials such as asbestos and polychlorinated biphenyls (PCBs) *http://www.epa.gov/compliance/civil/tsca/index.html*

2.1.3 Resource Conservation and Recovery Act (RCRA)

RCRA regulates the generation, transportation, treatment, storage, and disposal of hazardous chemical wastes, non-hazardous solid wastes, and hazardous or petroleum products stored in underground storage tanks (USTs).

Under the authority of the New Mexico Hazardous Waste Act (NMHWA) and under delegated authority from EPA under RCRA, the NMED administers hazardous and solid waste regulatory programs in New Mexico. Hazardous and solid waste management activities at SNL/NM are conducted under NMED regulations. Some additional RCRA requirements and regulations of the EPA also apply. Applicable regulations are listed in Chapter 9.

The hazardous component of hazardous/radioactive mixed waste (MW) is regulated as hazardous waste and is subject to the requirements of state and federal regulations. The radioactive component of MW is regulated under the Atomic Energy Act (AEA) of 1946.

Sandia Corporation generates hazardous and MW through normal operations. Sandia Corporation also generates hazardous and MW through the ongoing environmental restoration (ER) project involving cleanup of sites that were formerly used for operations such as testing and disposal. Sandia Corporation has an active and successful program to minimize hazardous and MW through product substitutions, process changes, material re-use, and recycling. See Chapter 3 (Section 3.3) for more details.

Chapter 3 summarizes Sandia Corporation's hazardous waste management activities during 2005.

Permits – On February 6, 2002, Sandia Corporation and DOE submitted a comprehensive RCRA Part B (final) permit request for operating nine units used for hazardous and MW management. The permit request included: requests for renewal of the existing permits for the Hazardous Waste Management Facility (HWMF) and the Thermal Treatment Facility (TTF); updated applications for operating permits for the Radioactive and Mixed Waste Management Facility (RMWMF), the High Bay Waste Storage Facility (HBWSF), and seven Manzano Storage Bunkers (MSB); a new application for operation of the Auxiliary Hot Cell Facility (AHCF); and requests for renewal of existing permits and authorizations for the Corrective Action Management Unit (CAMU) and associated treatment operations. Sandia and DOE continue to operate under the existing permits during the permit renewal process. Since the initial submittal, SNL/NM and DOE have revised the permit request several times in response to NMED comments, NMED requests for additional information, and changes in waste management operations. SNL/NM and DOE withdrew the permit applications for the HBWSF and two MSBs because these units will not be needed for future hazardous and MW management. SNL/NM and DOE requested significant modifications to the permit for the CAMU to reflect the completion of treatment activities, placement of all soils in the containment cell, and construction of the cover on the cell during 2003. The most recent revision was submitted on October 25, 2005. Active permits are listed in Chapter 9.

During 2005, Sandia Corporation and DOE also requested minor modification to the existing permits for the HWMF and TTF to reflect changes in personnel and operations. NMED reviewed the changes for both units, but did not issue a final determination during 2005.

Closures – During 2005, Sandia Corporation continued closure and post-closure care activities for hazardous waste management units that are no longer used as follows:

Chemical Waste Landfill (CWL) - The CWL was used for hazardous waste disposal under interim status until 1985. Sandia Corporation and DOE continued closure activities during 2005. Details are included in Chapter 3, Page 3-4.

CAMU – Sandia Corporation and DOE are currently conducting post-closure care. Details are included in Chapter 3, Page 3-4.

HBWSF – Sandia Corporation no longer needs the waste storage capacity provided by the HBWSF. In July 2005, Sandia Corporation began closure activities under the closure plan approved by NMED in November 2004.

MSB – Sandia Corporation no longer needs the waste storage capacity provided by two of the seven MSBs. These units were not used for storage of hazardous or MW under interim status. Sandia and DOE submitted a letter to NMED stating the units were not used; NMED is reviewing the information.

2.1.4 Federal Facility Compliance Act (FFCA)

The FFCA requires federal facilities to comply with all federal, state, and local requirements for hazardous and solid waste. On October 4, 1995, the NMED, DOE, and Sandia Corporation entered into a Federal Facility Compliance Order (FFCO) for management of MW at SNL/NM. A general Site Treatment Plan (STP) and a schedule for processing the waste were developed.

In 2005, Sandia Corporation continued to characterize and treat MW, and to package wastes for shipment to permitted off-site treatment, storage, and disposal (TSD) facilities. Sandia Corporation met all milestones in the STP.

2.1.5 Atomic Energy Act (AEA)

In 1946, the AEA was created to encourage the development and use of nuclear energy for general welfare, common defense, and security. The purpose of the AEA is to assure the proper management of nuclear materials and radioactive waste. The AEA, as amended, delegates the control of nuclear energy and nuclear materials primarily to the DOE, the U.S. Nuclear Regulatory Commission (NRC), and the EPA. Federal regulations control radioactive emissions and the transport of nuclear materials. The authority for controlling radioactive waste is retained by the DOE and is governed by DOE Orders.

2.1.6 Clean Air Act (CAA) and Clean Air Act Amendments (CAAA) of 1990

The objectives of the CAA and the CAAA are to protect and enhance the quality of the nation's air. The EPA is responsible for describing and regulating air pollutants from stationary and mobile sources and for setting ambient air quality standards. The City of Albuquerque has direct delegation from EPA Region VI to locally administer these standards as well as specific air emission permits and registrations as shown in Chapter 9, Table 9-1.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

NESHAP regulates releases of hazardous air pollutants to the air. Subpart H of 40 CFR 61 specifically regulates radionuclide emissions, other than radon, from DOE facilities. As required by the regulation, Sandia Corporation calculates an annual dose to potentially exposed members of the public from actual or calculated emissions. The regulation requires that Sandia Corporation determine the maximum possible dose that could be delivered to an individual residing at a nearby location 24 hours per day. The result is the effective dose equivalent (EDE) to the maximally exposed individual (MEI). The dose is compared to the EPA standard of 10 millirem per year (mrem/yr) allowed from radioactive air emissions from a DOE facility.

In 2005, the MEI was located at the Kirtland Storage Facility, just NW of Technical Area V (TA-V). The dose at this location was .00082 mrem/yr. The off-site MEI was located at the Eubank Gate Area. The dose at this location was .0001 mrem/yr. Both doses are well below the EPA standard. Sandia Corporation met all NESHAP compliance requirements in 2005. For perspective, the annual radiation dose from natural background radiation is about 360 mrem/year.

2.1.7 Clean Water Act (CWA)

The CWA sets forth goals to protect "Waters of the U.S." by controlling the discharge of pollutants. At SNL/NM, the CWA applies to sanitary and septic system wastewater effluents, storm water runoff, and surface water discharges. The CWA is implemented through local, state, and federal water quality standards as follows: (1) the City of Albuquerque administers regulations for sanitary sewer discharges based on federal pretreatment standards; (2) the EPA and NMED administer regulations concerning oil storage and surface discharges; and (3) the EPA has regulatory authority over storm water discharges and mandates requirements for oil storage and secondary containment.

New Mexico Stream Standards

New Mexico is in the process of obtaining the authority to regulate discharges under the National Pollutant Discharge Elimination System (NPDES). New Mexico's goal is to obtain this authority by 2008; until then, EPA Region VI is the permitting agency. New Mexico has enacted 20 6.4 NMAC "Standards for Interstate and Intrastate Surface Waters" to protect the quality of surface waters in the State. Due to the hydrologic conditions at SNL/NM, Sandia Corporation does not specifically monitor for compliance with these standards. SNL/NM does compare analytical results from NPDES sampling with the stream standards. Some constituents of

concern in New Mexico's Stream Standards that are not on the NPDES analyte list have been added to SNL/NM's analyte list to confirm compliance.

City of Albuquerque Sewer Discharge Regulations
There are five wastewater monitoring stations, or outfalls, at SNL/NM permitted by the City of Albuquerque. Four of these stations discharge directly to the City of Albuquerque public sewer and one is a categorical pretreatment station that is located upstream of the general outfalls. No permit limits were exceeded in 2005.

Surface Discharge
Surface discharges made to the ground or to containment areas must be evaluated for compliance with regulations implemented through the NMED Water Quality Control Commission (NMWQCC). Sandia Corporation issued 17 one-time internal surface discharge permits in 2005. Additionally, two evaporation lagoons in TA-IV are permitted by the NMED. The TA-IV lagoons are used to contain and evaporate accumulated storm water pumped from the secondary containment areas around seven oil tanks, which support the pulsed power accelerators. All permit conditions for the TA-IV lagoons permitted sites (DP-530) were met in 2005. In 2005, there were four reportable surface releases that met NMED reporting standards that were reviewed by the Surface Discharge Program. These reportable releases are documented in Section 2.2.2 and Section 6.2.2.

NPDES
NPDES implements the requirements that are specific to all discharges made to "Waters of the U.S." as defined in the CWA and "Surface Waters of the State" as defined in New Mexico's Standards for Interstate and Intrastate Surface Waters (NAMC 20.6.4). At SNL/NM, all point sources discharge to either a Water of the U.S. or Surface Water of the State and are evaluated for compliance.

Collecting visual and analytical samples at SNL/NM has always been a challenge due to Albuquerque's climatic condition. Analytical sampling was not required in FY05, but visual is conducted every quarter if there is sufficient runoff (Section 6.3.4).

2.1.8 Safe Drinking Water Act (SDWA)

The SDWA sets national standards for drinking water sources, treatment systems and water distribution. SDWA standards are designed to protect human health by regulating the allowable amount of chemicals, metals, radionuclides, bacteria, and other potential pollutants in potable water.

Drinking Water Supply at SNL/NM
Potable water for most facilities on KAFB (including SNL/NM) is provided by the KAFB Water System. The system derives its water from deep groundwater wells (discussed in Chapter 7). KAFB routinely samples its water for trihalomethanes, coliforms, volatile organic compounds (VOCs), gross alpha and gross beta radioactivity, and various inorganic chemicals, including metals.

Information on the KAFB Water System is located on the EPA's SDWA website, which details the compliance status for all drinking water systems in the U.S.:

http://www.epa.gov/safewater

2.1.9 Toxic Substances Control Act (TSCA)

TSCA addresses the import, export, use, and disposal of specifically listed toxic chemicals. At SNL/NM, compliance with TSCA primarily involves the handling and disposal of polychlorinated biphenyls (PCBs) and asbestos. Sandia Corporation was in full compliance with TSCA in 2005. Details related to TSCA are in Chapter 3 (Section 3.2.1).

2.1.10 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA regulates the use of pesticides and is enforced under the New Mexico Pesticide Control Act. Sandia Corporation's Biological Control Activity compiles information on pesticide use at SNL/NM, as discussed in Section 3.5. Sandia Corporation was in full compliance with FIFRA in 2005.

2.1.11 National Environmental Policy Act (NEPA)

NEPA requires federal agencies, and other organizations that perform federally-sponsored projects, to consider environmental issues associated with proposed actions, be aware of the potential environmental impacts associated with these issues, and include this information in early project planning and decision-making. Additionally, if a proposed

action is not within a class of actions previously determined to have environmentally "insignificant" impacts, the agency must prepare an environmental assessment (EA) or an environmental impact statement (EIS) before making an irretrievable commitment of resources or funding. Although a major objective of NEPA is to preserve the environment for future generations, the law does not require an agency to choose a course of action with the least environmental impacts. Details are provided in Section 3.6.

2.1.12 Endangered Species Act (ESA)

The law ensures that any action authorized, funded, or carried out by a federal agency will not jeopardize the continued existence of a "threatened or endangered species," or result in adverse modifications to its habitat. At SNL/NM, ESA compliance is coordinated with NEPA compliance reviews and the Ecology Program. Table 2-2 lists threatened and endangered species potentially occurring in Bernalillo County.

2.1.13 Migratory Bird Treaty Act (MBTA)

The MBTA of 1918 implemented the 1916 Convention for the protection of migratory birds. The original statute implemented the agreement between the United States (U.S.) and Great Britain (for Canada) and later amendments implemented treaties between the U.S. and Mexico, the U.S. and Japan, and the U.S. and Russia. The MBTA prevents the taking, possession, killing, transportation, and importation of migratory birds, their eggs, parts, and nests. At SNL/NM, the MBTA is coordinated with NEPA compliance reviews and the Ecology Program.

2.1.14 Cultural Resources Acts

The three primary cultural resources acts applicable at SNL/NM are as follows:

- National Historic Preservation Act (NHPA)
- Archaeological Resources Protection Act (ARPA)
- American Indian Religious Freedom Act (AIRFA)

At SNL/NM, cultural resources compliance is coordinated through the NEPA Program. Actions that could adversely affect cultural resources are initially analyzed in a NEPA checklist. Historical properties, as defined by NHPA and implementing regulations, include archaeological sites, historic buildings, and structures. Historic buildings and structures may include those over 50 years old that are historically significant, or younger structures of exceptional significance.

There are no known archaeological sites located on DOE/NNSA-owned property, although cultural and historic sites do exist on and in close proximity to DOE/NNSA-permitted property and ER sites. These areas are located both on U.S. Air Force (USAF) property and on portions of the Cibola National Forest land withdrawn area. Sandia Corporation's activities are planned to avoid potential impacts to these archaeological sites. It is the DOE/NNSA responsibility to ensure that impacts to cultural resources are assessed and appropriate actions taken for mitigation.

Historical Building Assessment

In 2005, with regard to SNL/NM, DOE/NNSA/SSO completed consultation with the New Mexico State Historic Preservation Office (SHPO) on 28 individual buildings. Of these, only one building was found to be eligible to the National Register of Historic Places. Recordation is underway at the site. Consultation was also completed on the majority of the buildings at SNL/NM's Lurance Canyon Burn Site and Thunder Range, neither of which was found to be eligible to the National Register. Thunder Range was determined to be historically significant, but lacked integrity for its period of significance. In addition, documentation continued on the environmental test facilities included in the Test Capabilities Revitalization Project. Previously, one building and four districts were found eligible for the National Register of Historic Places.

2.1.15 Environmental Compliance Executive Orders (EOs)

EOs related to environmental compliance include:

Floodplain Management (EO 11988), as amended – EO 11988 has minimal impact for SNL/NM, since all active SNL/NM facilities are located outside the 500-year floodplain as described by the U.S. Army Corps of Engineers (ACE) (USACE 1979). This applies to both major on-site drainages: Tijeras Arroyo and Arroyo del Coyote.

TABLE 2-2. Threatened and Endangered Species Potentially Occurring in Bernalillo County, New Mexico

Species		Federal Status	State Status	Observed at KAFB
MAMMALS				
Spotted Bat	*Euderma maculatum*	--	Threatened	
New Mexican Jumping Mouse	*Zapus hudsonius luteus*	--	Threatened	
FISH				
Rio Grande Silvery Minnow	*Hybognathus amarus*	Endangered	Endangered	
BIRDS				
Bald Eagle	*Haliaeetus leucocephalus*	Threatened	Threatened	
Common Black-hawk	*Buteogallus anthracinus anthracinus*	--	Threatened	
American Peregrine Falcon	*Falco peregrinus anatum*	--	Threatened	✓
Mexican Spotted Owl	*Strix occidentalis lucida*	Threatened	--	
White-eared Hummingbird	*Hylocharis leucotis borealis*	--	Threatened	
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	Endangered	Endangered	
Whooping Crane	*Grus americana*	Endangered	Endangered	
Bell's Vireo	*Vireo bellii*	--	Threatened	✓
Gray Vireo	*Vireo vicinior*	--	Threatened	✓
Baird's Sparrow	*Ammodramus bairdii*	--	Threatened	✓
Neotropic Cormorant	*Phalacrocorax brasilianus*	--	Threatened	
Yellow-billed Cuckoo	*Coccyzus Americanus*	Candidate	--	

Protection of Wetlands (EO 11990), as amended – Wetlands are areas inundated by surface or groundwater with a frequency sufficient to support a prevalence of aquatic plant and/or animal life. Wetlands generally include swamps, bogs, potholes, ponds, mudflats, and areas around natural springs. There are several natural springs on KAFB with a limited wetland setting. These springs, located on lands withdrawn from the Cibola National Forest, are managed by the USAF and the U.S. Forest Service (USFS). The springs provide an important source of drinking water for wildlife and create a unique biological niche in an otherwise arid habitat.

Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898), as amended – To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the Report on the National Performance Review (Gore 1993), each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the U.S. and its territories and possessions. DOE/NNSA/SSO and SNL/NM perform an analysis periodically to assess whether their existing or proposed operations cause any disproportionate impacts on minority or low-income populations within the area of influence of SNL/NM operations.

Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition (EO 13101) – EO 13101 requires all federal agencies to incorporate waste prevention and recycling into daily activities and participate in affirmative procurement. Waste minimization and pollution prevention (P2) activities at SNL/NM are discussed in Section 3.4.

Greening the Government Through Efficient Energy Management (EO 13123) – EO 13123 calls for improvements in Energy Management including the promotion of energy efficiency, water conservation, and the use of renewable energy products, and fostering markets for emerging technologies.

Greening the Government Through Leadership in Environmental Management (EO 13148) – EO 13148 requires federal agencies to ensure that "all necessary actions are taken to integrate environmental accountability into agency day-to- day decision-making and long-term planning processes, across all agency missions, activities, and functions." Among the primary agency goals is support to the development and implementation

TABLE 2-3. SNL/NM Radiological Dose Reporting for Calendar Year 2005

Pathway	Dose to MEI		Percent of DOE 100 mrem/yr Limit	Estimated Population Dose (80 km radius)		Population within 80 km radius of site	Estimated Background Radiation Population Dose	
	mrem	mSv		Person-rem	Person-Sv		Person-rem	Person-Sv
Air	8.2E-4	8.2E-6	0.001 percent	1.7E-04	1.7E-06	793,740	-	-
Water	0	0	0	0	0	0	-	-
Other Pathways	0	0	0	0	0	0	-	-
All Pathways	8.2E-4	8.2E-6	0.001 percent	1.7E-04	1.7E-06	793,740	2.9E5	2.9E3

Radiological Atmospheric Releases for 2005 (in Curies)										
Tritium	Kr^{85}	Noble Gases ($t_{1/2}$ <40 days)	Fission and Activation Products ($t_{1/2}$ <3 hr)	Fission & Activation Products ($t_{1/2}$ >3 hr)	Total Radio-iodine	Total Radio-strontium	Total U	Pu	Other Actinides	Other
11.5	0	4.87	2.0E-7	1.2E-6	0	3.5E-7	0	1.0E-7	2.2E-5	0

Liquid Effluent Releases of Radioactive Material for 2005						
Tritium	Fission and Activation Products ($t_{1/2}$ <3 hr)	Fission & Activation Products ($t_{1/2}$ >3 hr)	Total Radio-iodine	Total Radio-strontium	Total U	Pu
0	0	0	0	0	0	0

NOTES: mrem = millirem
mSv = millisievert
DOE = U.S. Department of Energy
km = kilometer
U = Uranium
Pu = Plutonium
MEI = maximally exposed individual

of environmental management systems, and the establishment of environmental compliance audit programs and policies "that emphasize pollution prevention as a means to both achieve and maintain environmental compliance." Sandia Corporation is currently working under DOE Order 450.1 to meet the requirements of this EO (DOE 2005).

Greening the Government Through Federal Fleet and Transportation Efficiency (EO 13149) – EO 13149 encourages the reduction of petroleum consumption through improvements in fleet fuel efficiency and the use of alternative fuel vehicles (AFVs) and alternative fuels. Sandia Corporation utilizes alternative fuel vehicles including bio-based fuels, natural gas, and electric carts.

2.1.16 DOE Directives

DOE directives on the contract baseline that pertain to environmental protection and management are discussed in Chapter 1, "Operations Contract." In 2005, Sandia Corporation met all requirements stated in these DOE directives.

2.1.17 Summary of Radiological Releases

A summary of radiological releases and public dose resulting from Sandia Corporation operations is provided in Table 2-3. More detailed information is found in Chapters 5 and 6 of this report.

2.2 2005 RELEASES, COMPLIANCE ISSUES, AND ENVIRONMENTAL OCCURRENCES

Under DOE Manual 231.1-2, an occurrence is defined as one or more (i.e., recurring) events or conditions that adversely affect, or may adversely affect DOE (including NNSA) or contractor personnel, the public, property, the environment, or the DOE mission. Events or conditions meeting criteria thresholds identified in DOE M 231.1-2 or determined to be recurring through performance analysis are occurrences. In addition, there are environmental releases that may not meet the DOE M 231.1-2 reporting thresholds but are still reportable to outside agencies (see Section 2.2.2 and 6.2.2).

2.2.1 Occurrence Tracking

DOE occurrence reporting (OR) is tracked by the Environment, Safety and Health (ES&H) Assurance, Planning and Behavior Based Safety Department. All SNL/NM occurrences are entered into the DOE Occurrence Reporting and Processing System (ORPS) database, which also tracks corrective actions and closure of occurrence reports.

For all categories during 2005, there were 86 occurrences, one of which was environmentally related:

NA-SS-SNL-NMSITE-2005-0005 - Recurring Occurrence on Work Control Issues (this OR involved work control issues pertaining to 39 ORs. Of these ORs with work control issues, there were several that were environmentally-related).

DOE Order 231.1-2 2005 Environmental Occurrences

DOE Manual 231.1-2 environmental and environmentally-related occurrences for five years (2001-2005) are shown in Table 2-4. This table shows all occurrences for which "nature of occurrence" (pre-August 25, 2003) and "reporting criteria" (post- August 25, 2003) included "environmental." In 2005, there were six reportable environmental occurrences. Five occurrences were categorized as Significance Category 4, the lowest level occurrence, and one was categorized as a Significance Category 2.

There were two additional occurrences that were not reported under environmental reporting criteria, but that were of possible environmental concern. Table 2-5 summarizes DOE Manual 231.1-2 2005 Reportable Environmental Occurrences.

2.2.2 Environmental Release Tracking

Environmental releases include releases to the environment that are not tracked through ORPS, including notifications to outside agencies.

2005 Environmental Releases

In 2005, there were four reportable environmental releases to outside agencies, one of which was tracked through ORPS. Detailed information regarding these releases can be found in Section 6.2.2.

2.3 2005 AUDITS AND APPRAISALS

Operations at SNL/NM and DOE/SSO are routinely subjected to audits by external regulatory agencies. Sandia Corporation also conducts its own self-assessments and appraisals. Environmental audits and appraisals conducted by external agencies in 2005 are listed in Table 2-6.

2.4 SUMMARY OF REPORTING REQUIREMENTS

External reporting requirements (other than to the DOE) are necessary for both non-routine and routine releases of pollutants or hazardous substances. Release information may be used to evaluate facility operation compliance, waste handling activities, and emergency response programs. Table 2-7 summarizes the primary reporting requirements for releases applicable to SNL/NM.

2.5 SUMMARY OF ENVIRONMENTAL PERMITS

Table 9-1 in Chapter 9 lists all environmental permits and registrations that were in effect in 2005. This includes permit applications that are pending and are under review by various agencies.

2.6 ENVIRONMENTAL PERFORMANCE MEASURES

Environmental performance at SNL/NM is tracked through performance measures and indicators, and reported through management reports and annual summaries, such as this report.

SNL/NM executive management has established high-level corporate ES&H objectives, which are:

- Zero job-related injuries and illnesses;
- Zero environmental incidents; and
- Zero operations fines, violations, or penalties.

In support of these objectives, seven specific ES&H measures have been adopted, with specific numerical expectations for each. These are listed in Table 2-8.

Environmental performance is also assessed through performance measures in the Performance Evaluation Plan (PEP) agreement between DOE/NNSA/SSO and Sandia Corporation. On the basis

of the PEP, DOE/NNSA SSO prepares an annual Performance Evaluation Report (PER) assessing SNL/NM's performance for the Fiscal Year (FY). For 2005, the overall score for Sandia Corporation was good.

TABLE 2-4. Environmentally-related Occurrences for Five Years (2001-2005)

Nature of Occurrence or Reporting Criteria	Year				
	2001	2002	2003	2004	2005
Environmental - Radionuclide Releases 2A		1			
Environmental - Release of Hazardous Substance/Regulated Pollutants/Oil 2B	3	4			
Environmental - Environmental Agreement/Compliance Activities 2E	3	6	2		
Environmental Releases 5A(1)			1		
Value Basis Reporting - Cost Based Occurrences 7A		2			
Release of Hazardous Substance, Material or Waste 5A (4)				4	2
Notice of Violation 9(2)				1	1
Other 10(2)				3	1
Any discharge that exceeds 100 gallons of oil in any form 5A(2)					1
An event that results in a significance concern by affected state, tribal, or local officials, press, or general population; that could damage the credibility of the Department or that may result in inquiries to Headquarters 10(4)					1

TABLE 2-5. DOE Manual 231.1-2 2005 Reportable Environmental Occurrences

Date	Occurrence Significance Category	Reporting Criteria	Description
February 2005	4	10(2)	A pressure vessel assembly that was being calibrated experienced rapid depressurization from approximately 47,000 psi to 0 psi when one component of the assembly (a steel plate ordinarily secured to the top of the assembly with ten steel tie rods and nuts) separated from the main body. The physical separation of components caused a release of a relatively small volume of the pressurizing medium (Isopar mineral oil in liquid form), thus resulting in the pressure drop.
April 2005	4	10(4)	The Groundwater Protection Program (GWPP) was informed by the Water Quality Program Manager that Sandia Corporation had not performed the required 3rd quarter sampling of three specified GWPP monitoring wells for perchlorate screening as required by the New Mexico Environment Department (NMED) - DOE/SSO Compliance Order.
May 2005	2	5A(2)	An oil leak was discovered at Fleet Services. The majority of the oil was contained in the hoist pit. A smaller quantity was discharged to the concrete bay floor. No oil was released to the environment or discharged to the sanitary sewer.
July 2005	4	5A(4)	During ongoing decontamination and demolition of Building 6536, mercury was found. The trench along the inside of the west wall of the building was inaccessible at that time, so plans were made to investigate the trench at a later date. Subsequently, free mercury was found in the trench along the west wall. In addition, an opening was observed in the northwest corner at the bottom of the trench, which appeared to penetrate the foundation, extending to an excavation outside the building. The spill occurred within Building 6536 and there was no apparent migration path to the exterior of the building (see Section 3.2.2 for more information about this occurrence).
July 2005	4	9(2)	Testing performed at the Steam plant was incomplete as required in the New Source Review Synthetic Minor Air Emissions Permit #1705. The record keeping requirements were not being complied with. Corrective actions taken in response to the Notice of Violation (NOV) are summarized in Section 5.5.1 (Steam Plant).
November 2005	4	5A(4)	Reapplication personnel reported that five hot-cell window units stored in the Reapplication Services yard leaked 96 gallons of mineral oil onto the ground where they had been stored. The hot-cell windows were isolated and the contaminated soil was removed. There was no further release to the environment.

TABLE 2-6. Environmental Program Audits and Appraisals Conducted In 2005

Appraising Agency	Title	Date	Summary
External Audits and Appraisals			
DOE OA	ES&H and Emergency Management	March – April 2005	Office of Independent Oversight and Performance Assurance: Twenty-nine findings in ES&H – five against SSO and 24 against SNL/NM.
NMED	RCRA Compliance	May 2005	NMED noted 3 potential violations during the inspection. No final report was received during 2005 regarding the inspection.
NMED	RCRA Compliance	November 2005	NMED noted 3 potential violations during the inspection. No final report was received during 2005 regarding the inspection.
NMED	Inspection of NMED Discharge Plan-530 (DP-530) Technical Area 4 (TA-IV) Lagoons	March 3, 2005	On March 3, 2005, NMED inspected the TA-IV lagoons for compliance with the NMED issued Discharge Plan. All conditions and requirements were met.
NMED	DP-530 Pulsed Power Lagoon Inspection	Monthly	Monthly internal inspections were performed by SNL/NM and documented on monthly inspection checklists filed in the ES&H and Emergency Management Records Center.
COA	Air Quality Inspection	April 2005	COA inspection of Steam Plant resulted in a Post Inspection Notification and NOV.
COA	Wastewater Inspection	May 2005	COA inspection of flow basin 2069G. There were no findings.
COA	Wastewater Inspection	September 2005	COA inspection of flow basins 2069A & 2069I. There were no findings.
COA	Wastewater Inspection	October 2005	COA inspection of flow basins 2069F. There were no findings.
COA	Compliance Sampling	March 2005 & September 2005	COA performed compliance sampling. There were no findings.
Internal Audits and Appraisals			
DOE/SSO	Environmental Protection/ Storm Water	September 2004 – January 2005	Completed: 5 Findings, 1 Observation, 1 Noteworthy Practice
DOE/SSO	Environmental Protection/ Wastewater	June - August 2005	Completed: 1 Observation, 2 Noteworthy Practices
DOE/SSO	ISMS/ISMS Program	September – October 2005	Completed: 2 observations
Sandia 12870	ISMS/Identify Hazards/ ISMS Program & System Description "Hazard Identification & Analysis"	April 2005	Final report issued: 1 Issue 4 Observations 5 Strengths

See notes at end of table.

TABLE 2-6. Environmental Program Audits and Appraisals Conducted In 2005 (concluded)

Appraising Agency	Title	Date	Summary
Sandia 12870	ISMS/ISMS Program & System Description & Risk Management/Authority Basis "Non-nuclear Safety Basis Program Activities at SNL"	May 2005	Final report issued: 2 Issues 3 Observations 2 Strengths
Sandia 12870	Radioactive & Mixed Waste/Operations "SNL Manzano Nuclear Facilities to 10 CFR 830 Subpart A Quality Requirements"	May 2005	Final report issued: 4 Issues 6 Observations 3 Strengths
Sandia 12870	Environmental Protection/Groundwater "Groundwater Protection Program Assessment"	June 2005	Final report issued: 4 Issues 2 Observations 2 Strengths
Sandia 12870	Environmental Protection/Environmental Management Systems "Environmental Management System Implementation"	November 2005	Final report issued: 3 Observations 4 Strengths

NOTES: ISMS = Integrated Safety Management System
NMED = New Mexico Environment Department
NOV = Notice of Violation
RCRA = Resource Conservation and Recovery Act
COA = City of Albuquerque
ES&H = Environment, Safety & Health
SNL = Sandia National Laboratories
DOE OA = Department of Energy, Office of Independent Oversight and Performance Assurance
SSO = Sandia Site Office

TABLE 2-7. Summary of Sandia Corporation's Reporting Requirements to Outside Agencies (Other than DOE) for Releases of Pollutants or Hazardous Substances

Report Title	Description	Agency
Annual NESHAP Dose Assessment Report	A dose assessment of the calculated effective dose equivalent (EDE) to the maximally exposed individual (MEI) is based on the assumption that an exposed individual resides 24 hours per day at an area of highest incident radiation. Dose assessment is discussed in Section 5.4 of this report.	EPA 40 CFR 61, Subpart H
Reportable Quantity (RQ) Accidental Release Reporting	RQ release reporting is required by CERCLA and SARA Title III, or EPCRA to the NRC. CERCLA and EPCRA are discussed in Section 2.1.1 and 2.1.2 of this report. As discussed in Section 2.1.2, there were no reportable releases at SNL/NM under CERCLA or EPCRA in 2005.	NRC 40 CFR 302
Toxic Release Inventory (TRI) Report	EPCRA, Sections 302, 311, 312, and 313, requires a TRI report to be filed by facilities conducting specifically listed industrial activities and using listed toxic chemicals. As discussed in Section 2.1.2, Sandia Corporation is currently required to submit a TRI report because its chemical use is above the reporting threshold.	EPA 40 CFR 372, Subpart B
Notification of Discharge	NMED requires reporting of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or use of the property shall make oral notification as soon as possible after learning of such a discharge, but in no event more than 24 hours thereafter to the NMED. Within one week, the owner and/or operator shall send written notification to the appropriate Bureau Chief verifying the prior oral notification. Within 15 days, the owner and/or operator shall send written notification to the appropriate Bureau Chief describing any corrective actions taken and/or to be taken relative to the discharge. Four surface discharge releases occurred in 2005. Details are summarized in Section 6.2.2.	NMED 20.6.2.1203 NMAC
Accidental Slug Discharge Notification	The City of Albuquerque requires immediate notification to the Wastewater Utility Division of any accidental/slug discharge that may cause potential problems for the POTW. Within five days following such occurrence, the user is required to provide the Industrial Waste Engineer with a detailed written report describing the cause of the dangerous discharge and measures to be taken to prevent similar future occurrences. No events were reported to the City of Albuquerque in 2005.	City of Albuquerque Ordinance § 6-3-5

NOTES: NESHAP = National Emission Standards for Hazardous Air Pollutants
NRC = U.S. National Response Center
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
SARA = Superfund Amendments and Reauthorization Act
EPCRA = Emergency Planning and Community Right-to-Know Act
EPA = U.S. Environmental Protection Agency
POTW = Publicly-Owned Treatment Works
SNL/NM = Sandia National Laboratories, New Mexico
NMED= New Mexico Environment Department
NMAC = New Mexico Administrative Code
CFR = Code of Federal Regulations

TABLE 2-8. Environmental, Safety and Health Performance Measures

Measure	2004 Actual	2005 Goal	2005 Actual	2006 Goal
Total Recordable Case Rate	3.0	1.75	2.7	2.2
Days Away Case Rate	0.38	0.28	0.31	0.31
Days Away Rate	3.4	4.0	5.8	5.1
Hazardous Waste Generated (metric tons)	42.7	45	39.19	39.2
Percent Solid Waste Recycled	45.9	45	52	57
Number of Notices of Violation	2	0	1	0
Amount of fines or penalties	Negotiated $619,980 for 2003 NMED RCRA	$0	$97,080 Air Quality NOV	$0

chapter three

ENVIRONMENTAL PROGRAMS INFORMATION

In This Chapter ...

Environmental Snapshot

The Environmental Education Outreach Program participated in the following events in 2005:

- *Dia del Rio at the Albuquerque Aquarium*
- *Annual Youth Conference on the Environment*
- *New Mexico Environmental Health Conference*

Environmental programs at Sandia National Laboratories, New Mexico (SNL/NM) are in place to protect the environment, safety, and health (ES&H) of its employees and the community. Sandia Corporation has established and implemented environmental management (EM) programs to meet or exceed the requirements of federal, state, and local environmental regulations. U.S. Department of Energy (DOE) Orders and Executive Orders (EOs) also serve to guide program criteria.

Commitment to Health and the Environment

It is the DOE, National Nuclear Security Administration (NNSA), Sandia Site Office (SSO) and Sandia Corporation's policy to minimize risks to the public and the environment to "as low as reasonably achievable" (ALARA) levels. For example, Sandia Corporation often exceeds regulatory requirements through Best Management Practices (BMPs) and pollution prevention (P2) measures implemented on a corporate-wide basis.

Environmental Monitoring History at SNL/NM

Environmental monitoring began at SNL/NM in 1959 when the main objective was to monitor radioactive effluents and determine any associated environmental impacts. Since then, environmental programs, along with other ES&H activities, have greatly expanded at SNL/NM.

3.1 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

In accordance with Order 450.1, *Environmental Protection Program*, Sandia Corporation implemented an EMS as part of its Integrated Safety Management System (ISMS). An EMS is a continuing cycle of planning, evaluating, implementing, and improving processes and actions undertaken to achieve environmental goals. The EMS identifies the environmental consequences of SNL/NM's activities, products, and services, and develops goals and measurable activities to mitigate those impacts.

Tasks completed as part of the EMS implementation in 2005 include:

- The SNL/NM EMS Program Manual, PG470222, was written and issued.

- The SNL ISMS Description, CPR 400.1.2, was revised to reflect the integration of the EMS into ISMS.

- EMS Outreach events were conducted.

- A Program Self-Assessment was performed and a Self-Assessment Report was issued.

- Each Division appointed an EMS Champion and created an EMS Team to provide leadership within the division; set measurable environmental goals; created an EMS Action Plan to plan and track environmental goals; held EMS awareness briefings; and participated in the EMS Self-Assessment.

- An EMS Program Sandia 12870 assessment was performed and areas needing improvement were addressed.

On December 2, 2005, Sandia Corporation declared to the DOE/NNSA/SSO that it had fully implemented an EMS in accordance with the requirements outlined in DOE Order 450.1. Sandia Corporation's EMS is the basis of our proactive approach to managing environmental risks and protecting the environment.

The EMS is a continuous improvement system that includes all environmental programs in an integrated approach to effectively minimize the impact of SNL/NM's operations on the environment. Each year, SNL/NM's work processes are reviewed and new goals are set to ensure continued improvement in our environmental performance.

ES&H Policy, CPSR400.1

The ES&H Policy of Sandia Corporation is to support the corporate vision and protect and preserve the ES&H of its employees, contractors, visitors, and the public. Concern and conduct in matters pertaining to ES&H are the responsibility of all SNL/NM members of the workforce. SNL/NM's strategy for managing and implementing the ES&H Program is described in the CPR400.1.2, ISMS. Sandia Corporation's ES&H program mandates compliance with all applicable laws, regulations, DOE directives included in the

Prime Contract between DOE and SNL/NM, and internal corporate policy requirements. Sandia Corporation has adopted the core values of integrity, excellence, service to the nation and each other, and teamwork. Sandia Corporation strives to:

- Plan work, incorporating safety awareness, protective health practices, P2, and stewardship;
- Evaluate and manage risk with effective ES&H systems;
- Implement controls to prevent injuries, hazardous exposures, or releases;
- Do quality work while protecting people, the environment, and our nation's security;
- Continually improve our ES&H performance and incorporate lessons learned; and
- Communicate ES&H issues to our employees, the community, regulators, and stakeholders.

3.2 ENVIRONMENTAL RESTORATION (ER) PROJECT

Sandia Corporation's ER Project was created under the DOE Office of EM to identify, assess, and remediate sites potentially contaminated by past spill, release, and disposal activities.

The remediation and cleanup of areas of past contamination at SNL/NM are regulated by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984. HSWA requirements apply to ER sites, or Solid Waste Management Units (SWMUs) at SNL/NM. A SWMU is any unit "from which hazardous constituents might migrate, irrespective of whether the units were intended for the management of solid and or hazardous waste" (EPA 1985).

There are some additional sites at SNL/NM not regulated as SWMUs (primarily closed-out septic systems) that are also under ER investigation. These sites were not identified at the time of issuance of Module 4 of the RCRA Part B Operating Permit; they are being investigated and addressed in the same manner as if they were listed on the permit.

SNL/NM, DOE, and the New Mexico Environment Department (NMED) negotiated a Compliance Order on Consent (COOC) during 2003 that was signed in April 2004. It supports the goal of completing the ER Project by the year 2006.

3.2.1 Cleanup and Site Closures

Waste generated from SNL/NM ER sites includes RCRA-hazardous waste, radioactive low-level waste (LLW), mixed RCRA, mixed waste (MW), Toxic Substances Control Act (TSCA) waste (primarily polychlorinated biphenyls [PCBs] with some asbestos), and industrial solid waste. The waste management section in this chapter shows the waste volumes generated by the ER Project.

No Further Action (NFA) Status

ER sites are proposed for NFA based on insignificant contamination present or after remediation has been completed. At SNL/NM, remediation is accomplished through Voluntary Corrective Measure (VCMs) or Voluntary Corrective Actions (VCAs). Once the NMED grants NFA status, the site is placed in a table titled "Corrective Actions Complete Without Controls" or "Corrective Actions Complete With Controls," based on its land-use category. The majority of ER sites are granted NFA status under a risk based scenario. Risks to human health and the ecosystem are calculated according to guidance from the U.S. Environmental Protection Agency (EPA) and the NMED. Risk is calculated for sites with residual contamination. The level of contamination remaining and the appropriate land-use category (i.e., industrial use, residential use, or recreational) are used as input to determine any remaining risk to human health and the ecosystem. This method is used to ensure these calculated risks are small enough to warrant NFA status.

Table 3-1 shows the ER Project status since 1992. Sandia Corporation continues to actively pursue the closure of proposed NFA sites by working with the NMED to provide adequate verification for a successful determination.

3.2.2 2005 Status and Activities

At the close of 2005, there were 110 regulated ER sites remaining on Sandia Corporation's RCRA Part B Operating Permit and no sites were being actively remediated at SNL/NM. In 2005, 21 sites were proposed for NFA. All NFA proposals and Class III Permit modifications are available for review at the University of New Mexico (UNM) Zimmerman

TABLE 3-1. Summary of ER Project Status

	A	B	C	D	E*	F***
Year	Total ER Sites at Start of Year	ER Sites Proposed for NFA	Sites Approved for NFA	Corrective Actions Completed by End of Year	New ER Sites Identified During Year	Total ER Sites at End of Year
2005	**126**	**21**	**18**	**51**	**+2****	**110**
2004	125	41	0	1	+1*	126
2003	126	15	0	5	-1	125
2002	158	3	30	2	-2	126
2001	87	7	0	4	71	158
2000	146	10	64	10	5	87
1999	146	4	0	20	0	146
1998	146	16	0	0	0	146
1997	153	30	7	4	0	146
1996	155	35	2	29	0	153
1995	191	61	36	34	0	155
1994	219	48	28	3	0	191
1993	219	0	0	0	0	219
1992	172	0	0	0	47	219

NOTES: FY = Fiscal Year
ER = Environmental Restoration
NFA = No Further Action
Column A is the Total ER Sites remaining to be removed from the RCRA Permit
*One Drain and Septic System (DSS) Area of Concern was determined to be inactive in Fiscal Year (FY) 2004, and submitted for NFA.
** Two DSS sites determined inactive in FY05 and were submitted for Corrective Actions Completed (NFA).
***Column totals: F = A - C + E
Some of the original 219 sites included Tonopah Test Range (TTR), Kauai Test Facility (KTF), and other off-site areas.

Library and Community Resources Information Office (CRIO).

In July 2005, during ongoing decontamination and demolition (D&D) of Building 6536, mercury was found. When the ER Project was established, a mercury spill in Building 6536 was identified as an ER Site (now tracked as SWMU 105). Because the spill occurred within Building 6536 and there was no apparent migration path to the exterior of the building, Sandia Corporation proposed in July 1995, and the regulator concurred in December 1995, that there had been no environmental release and no further action was necessary. Thus, no prior soil sampling for mercury has been performed at this location.

Under Section V of the COOC, written notification to the NMED is required for "any previously unknown release from a SWMU." Because the presence of mercury in the soil at SWMU 105 was previously unknown, this requirement pertains. Because the notification is non-routine, the event qualifies as an Occurrence of Significance Category 4 (see Table 2-5).

ER Project History

The initial identification of ER sites at SNL/NM was completed in 1987. At that time, 117 sites under Sandia Corporation's jurisdiction were identified in the initial *Comprehensive Environmental Assessment and Response Program (CEARP) Phase I: Installation Assessment* (DOE 1987).

Since then, a total of 500 individual sites, potential sites, or individual historical activities have been identified for investigation. Many of these sites were confirmed to contain little or no contamination of regulatory concern. In 1992, the ER Project at SNL/NM was officially initiated to implement assessment and remediation activities for sites that had been contaminated or potentially contaminated because of Sandia Corporation's past operations. In addition to the SNL/NM site, other sites included in the original scope of Sandia Corporation's ER Project were Sandia National Laboratories, Livermore, California (SNL/CA), the Kauai Test Facility (KTF), and the Tonopah Test Range (TTR). There were also a number of miscellaneous sites located in other areas, both nationwide and internationally.

Currently, the only ER sites remaining to be addressed are located at SNL/NM. All ER sites at SNL/NM, except the Mixed Waste Landfill (MWL) and the Canyons Area, have the completion goal date in 2006 with Long-term Stewardship (LTS) to follow. Further information on ER Management Units can be found in Section 3.2.4.

3.2.3 Long-term Environmental Stewardship (LTES) Activities

LTES activities for 2005 are discussed in this section. Additional LTES guidance is expected in 2006 and will be reflected in the 2006 Annual Site Environmental Report (ASER).

LTES at SNL/NM is defined as activities necessary to maintain long-term protection of human health, the environment, and natural and cultural resources from hazards associated with residual radioactive and hazardous contamination at former ER sites, including currently active sites.

Sandia Corporation's LTES activities have been increasing as the remedial activities required by ER sites are completed. The ER Project is focusing on project closure, while the SNL/NM LTES team is developing sensible, amicable, and cost effective solutions for the stewardship of our natural resources. LTES activities are being addressed through five internal groups: management and administration, community outreach, monitoring, institutional controls, and information management. Regulatory and DOE requirements for LTES are being reviewed, as well as suggestions generated by Kirtland Air Force Base (KAFB) tenants and stakeholders.
Please visit the LTES website for additional information:

www.sandia.gov/ltes

The ER Project and DOE worked with local stakeholders and community representatives to develop a draft LTES Plan (DOE/SNL 2001) that identified the major elements of an LTES Program. A stakeholder task group further revised Chapter 6 of the plan, which needed additional information or resolution. These revisions were completed in 2004. Sandia Corporation and DOE are in the process of developing an Implementation Plan.

Public Outreach and Communication
Stakeholders participate in quarterly DOE/Department of Defense (DoD) meetings on ER, as well as periodic LTES working groups and meetings. These meetings drive community input regarding LTES and offer the opportunity for progress reports on the current status of LTES. Stakeholders prioritized potential outreach activities during one of these meetings. The LTES team then implemented them, developing an LTES website for the public, a traveling LTES exhibit for use at conferences and workshops, an LTES curriculum for educational use, and a permanent LTES exhibit at the National Atomic Museum.

3.2.4 ER Management Units at SNL/NM

Chemical Waste Landfill (CWL)
The former CWL is approximately 1.9 acres and is located in the southeast corner of Technical Area (TA) III. Disposal operations at the CWL began in 1962. From 1962 until 1981, the CWL was used for the disposal of chemical and solid waste generated by SNL/NM research activities. From 1981 through 1985, only solid waste was disposed of at the CWL; after 1985, all waste disposal ended. The CWL was also used as a hazardous waste drum-storage facility from 1981 to 1989. The primary contaminants of concern at the CWL are volatile organic compounds (VOCs) and metals.

Excavation of the landfill began September 30, 1998. All excavation was completed in February 2002. Over 52,000 cubic yards of soil and debris were excavated from the landfill between 1998 and 2002. The majority of the soils were managed at the Corrective Action Management Unit (CAMU), adjacent to the CWL, for treatment and/or placement into the containment cell for long-term management. However, approximately 70 cubic yards of soil was disposed off-site due to radiological activity above CAMU acceptance criteria. Additionally, over 10,000 cubic yards of soil was removed as part of final clean-up activities conducted within the Landfill Excavation (LE) Voluntary Corrective Measure (VCM) site operational boundary (area east and adjacent to the former CWL) after the CAMU stopped accepting waste. The majority of this soil met the criteria for use as backfill based upon analytical results and was placed in the excavation at a depth greater than five feet below ground surface. Approximately 35 cubic yards of scraped site operational boundary soil required off-site disposal based upon analytical results. Sampling and final cleanup of the site operational boundary was completed in February

2004 and documented in a report approved by the NMED in October 2005.

As part of the CWL closure process defined in the amended Chapter 12 of the Closure Plan, SNL/NM submitted a compilation of documents to the NMED on May 20, 2003 that included the CWL Corrective Measures Study (CMS) Report, Remedial Action Plan (RAP), and Post-Closure Care Plan (PCCP). On December 12, 2003, the NMED rejected the CWL CMS Report and postponed the review of the RAP and PCCP pending the approval of a revised CMS Report (Kieling 2003). The December 2003 NMED letter contained general and specific comments on the CMS Report and requested the report be resubmitted by December 31, 2004.

A revised CMS Report was submitted in December 2004 as requested by the NMED, which included a revised RAP as an annex. A revised PCCP was submitted to the NMED as a permit application in September 2005 after receiving an NMED request for supplemental information (RSI) in July 2005 on the revised CMS Report. In addition to submitting revised versions of the three original May 2003 documents (CMS Report, RAP, and PCCP), SNL/NM requested NMED-approval of an Interim Corrective Measure (ICM) to allow construction of the at-grade landfill cover design, originally presented in the May 2003 RAP, prior to NMED-approval of the revised CMS Report. The ICM request was submitted to NMED in April 2004 and was approved in September 2004. Backfilling of the CWL to four feet below ground surface was completed in February 2004. The CWL cover installation began in March 2005 and was completed in September 2005.

CAMU

The CAMU is permitted under RCRA and TSCA for the management of remediation waste (primarily contaminated soil) generated during the Voluntary Corrective Action (VCA) conducted by the ER Project at the CWL. Storage, treatment, and containment activities are authorized under the CAMU permit (EPA 1997). The CAMU is located in TA-III next to the CWL and Radioactive and Mixed Waste Management Facility (RMWMF). Two treatment processes, Low Temperature Thermal Desorption (LTTD) and stabilization treatment (ST), were used as needed to treat soil wastes before they were placed in the containment cell. LTTD treatment operations were completed in December 2002. The remaining ST treatment activities at the CAMU were performed during January of 2003.

The staging, treatment, and support areas at the CAMU were clean-closed under the RCRA and TSCA provisions as outlined in the Closure Plan (SNL 2002c). The CAMU containment cell cover was installed in July 2003, which encapsulated the CWL remediation waste in place. The CAMU was certified closed on October 15, 2003, in compliance with the closure requirements documented in the RCRA Closure Report (SNL 2003j). The CAMU containment cell, where the treated waste remains, will continue to be monitored and maintained in accordance with post-closure requirements.

The CAMU containment cell design consists of engineered barriers and incorporates a bottom liner system with a leachate collection system, a final cover system, and a vadose zone monitoring system (VZMS). The VZMS provides information on soil conditions under the cell for early detection of leaks. The VZMS consists of three subsystems that include the primary subliner (PSL), vertical sensor array (VSA), and CWL and sanitary sewer line (CSS) monitoring subsystems. VZMS monitoring of the containment cell was conducted on a monthly basis through May 2005. In June 2005, quarterly monitoring was initiated. The PSL, VSA, and CSS monitoring subsystems were monitored for the composition of soil gases and soil moisture content.

In 2005, 2,905 gallons of leachate were pumped from the containment cell leachate collection system. The amount of leachate pumped weekly started out the year at 75 gallons and by the close of the year was down to 45 gallons. The amount of leachate is decreasing steadily as anticipated. Monitoring results for 2005 were generally consistent with baseline data established between January 1999 and December 2000. VZMS monitoring results are compiled and reported on an annual basis; the most recent report was submitted in September 2005 (SNL 2005n). The annual VZMS monitoring reports are submitted to NMED as required by the CAMU Permit (the EPA also receives a copy).

Groundwater Management Units

In 2005, SNL/NM ER performed groundwater monitoring at the CWL, MWL, Canyons, Tijeras Arroyo Groundwater (TAG) Investigation, and TA-V. SNL/NM will continue groundwater monitoring

as a part of Corrective Measures Implementation (CMI) and LTES. CMI monitoring activities for TAG and TA-V are scheduled to begin in February 2007, and LTS monitoring activities are scheduled to begin in October 2007.

The NMED has indicated that long-term groundwater monitoring will be required to address the uncertainty of future impacts of contamination on groundwater. Specific wells within CWL, MWL, Canyons, TAG, and TA-V networks will be proposed for long-term monitoring per separate requirements and site-specific monitoring plans, which will be developed and detailed in associated program plans. These program plans are contingent upon regulatory approval of corrective measure evaluation, corrective measures implementation, post-closure care provisions, long-term monitoring and maintenance plans, and other regulatory procedures.

SNL/NM anticipates groundwater monitoring for contaminants of concern at both the CWL (VOCs and metals) and MWL (VOCs, metals, and radiological parameters). Additionally, SNL/NM expects that, at a minimum, monitored natural attenuation (MNA) will be part of the selected remedy for Canyons, TAG, and TA-V groundwater monitoring sites. Until LTES is initiated, SNL/NM ER will continue semiannual groundwater monitoring at the CWL, annual sampling at the MWL, and semi-annual or quarterly monitoring at Canyons, TAG, and TA-V locations. Important dates follow:

- May 2005: SNL/NM submitted the Interim Measures Work Plan for Canyons groundwater area to NMED,

- July 2005: SNL/NM submitted the Corrective Measures Evaluation Report for TA-V Groundwater to NMED,

- September 2005: SNL/NM submitted the Corrective Measure Evaluation Report for TAG to NMED.

MWL

The MWL was established in 1959 as a disposal area for radioactive and mixed wastes (MW) generated at SNL/NM research facilities. The landfill accepted approximately 100,000 cubic feet of low-level radioactive waste (LLW) and minor amounts of mixed waste from March 1959 through December 1988. Tritium is the contaminant of primary concern at the MWL. It has been detected in surface and subsurface soils in and around the classified area of the landfill. However, there is no indication that tritium or other contaminants have migrated to groundwater, which is approximately 500 feet below the ground surface at the MWL. Tritium is released from MWL soils to the atmosphere at low levels, which do not pose a threat to human health or the environment.

A monitoring well network consisting of seven wells has been installed at the MWL. These wells are sampled annually for radionuclides, metals, VOCs and major ion chemistry. Sampling of these wells has been conducted since 1990. Additional information is in Section 7.2.2.

MWL Closure Status:

On October 11, 2001, the NMED directed the DOE and Sandia to conduct a CMS for the MWL. The MWL CMS Report was submitted to the NMED on May 21, 2003 for technical review and comment. The purpose of the CMS was to identify, develop, and evaluate corrective measures alternatives and recommend the corrective measure(s) to be taken at the MWL. Based upon detailed evaluation and risk assessment using guidance provided by the EPA and the NMED, the DOE and Sandia Corporation recommended that a vegetative soil cover be deployed as the preferred corrective measure for the MWL.

The NMED held a public comment period on the MWL CMS from August 11, 2004 to December 9, 2004. A public hearing was conducted on the MWL CMS on December 2-3 and 8-9, 2004. On May 26, 2005, the Secretary of the NMED selected a vegetative soil cover with bio-intrusion barrier as the remedy for the MWL. The selection was based on the administrative record and the Hearing Officer's report. The Secretary requested that a Corrective Measures Implementation (CMI) Plan incorporating the final remedy be developed within 180 days following the selection of the remedy.

On November 9, 2005, DOE and SNL/NM submitted a CMI Plan to the NMED, documenting the plans for construction of a cover for the MWL. The document contains a description of the selected remedy, the objectives for the remedy, detailed engineering design drawings and construction specifications, a construction quality assurance (QA) plan, and a health and safety plan. The cover design consists

of a 3-ft thick, vegetated soil cover overlying a 1-ft thick rock bio-intrusion barrier. The design will rely upon soil thickness and evapotranspiration to provide long-term performance and stability.

The CMI Plan also included the results of a comprehensive fate and transport model that was used to assess the performance of the MWL, and monitoring triggers for future action. The triggers identify and detail specific monitoring results that would initiate an evaluation process to determine whether corrective action was necessary.

Following remedy implementation, SNL/NM will develop a Long Term Monitoring and Maintenance Plan for the MWL to address monitoring, maintenance, and physical and institutional controls for the MWL.

3.3 WASTE MANAGEMENT

Waste at SNL/NM is processed at five facilities: the Hazardous Waste Management Facility (HWMF), the Thermal Treatment Facility (TTF), the RMWMF, the Manzano Storage Bunkers (MSB), and the Solid Waste Transfer Facility (SWTF). The primary waste types handled by these waste management facilities are shown below.

3.3.1 Hazardous and Chemical Waste

The HWMF packages, segregates, stores, and ships hazardous and chemical wastes. A lined catchment pond within the HWMF perimeter is used to contain all storm water runoff; if there is a spill or release, this is monitored before discharging. Hazardous waste is tracked from the point of generation to final disposal through meticulous "cradle to grave" documentation at each waste-handling step. Each waste item received at the HWMF is labeled with a unique bar code, linking the item to the original disposal request. An individually coded waste item typically is a bottle, plastic bag, or other small item that contains chemical materials.

All waste is reviewed at the HWMF before being placed in temporary storage. After sufficient quantities of items have accumulated in the storage bays, the items are packed into larger containers, which are also bar coded. These packages are moved to an adjacent building to await shipment to a permitted treatment, storage, and disposal (TSD) facility or recycling center. Waste is usually processed and shipped off-site within 90 days of receipt.

Applicable regulations for hazardous and chemical waste handled by the HWMF are listed in Chapter 9.

2005 Activities at the HWMF

In 2005, a total of 11,758 package items were handled by the HWMF. The HWMF shipped a total of 555,531 kg (1,222,168 lb) of RCRA-regulated hazardous waste (including recyclable waste). Specific waste categories handled and shipped in 2005 are shown in Table 3-2. Additionally, there was an increase in ER related waste due to site closure activities.

Recycling

Sandia Corporation recycles all categories of hazardous and chemical waste, where feasible. RCRA recycled waste includes various batteries, silver compounds, mercury compounds, lamps, capacitors, and toxic metals. A total of 4,955 kg (10,901 lb) of RCRA hazardous waste and 37,897 kg (83,373 lb) of used oil was recycled. "Other recyclable waste" includes miscellaneous recycled categories not regulated under RCRA or Toxic Substances Control Act (TSCA). This category includes various batteries, fluorescent lamps, various oils, and non-PCB ballasts, lead, and capacitors. A total of 73,763 kg (162,279 lb) of material was recycled in this category. Waste recycled at SNL/NM in 2005 is shown in Table 3-3.

Asbestos Waste Handling

The abatement of asbestos-containing equipment and building materials is ongoing. Asbestos material removal is only done if the material presents an inhalation hazard, or if the building is to be torn down or renovated. Typical asbestos-containing building materials consist of floors, ceilings, and roofing tile, certain types of insulation, and other fire retardant construction materials.

Similarly, in instances where laboratory equipment has asbestos-containing material in a non-friable form (which poses no inhalation risk), the item is allowed to remain in service or is redistributed through the property reapplication program. Typical asbestos waste generated from equipment abatement consists of fume hoods, ovens, and cable insulation. In 2005, a total of 173,004 kg (380,609 lb) of asbestos waste was generated and disposed.

TABLE 3-2. Waste Shipped By the HWMF in 2005

Waste Categories Handled at the HWMF	2005 Waste Shipped	
RCRA Waste	**(kg)**	**(lb)**
Hazardous Waste	104,560	230,032
Hazardous Waste (Generated by ER Project)	446,016	981,235
Hazardous Waste (recycled)	4,955	10,901
Total	**555,531**	**1,222,168**
TSCA		
Asbestos	173,004	380,609
PCB (recycled NR)	4,829	10,624
PCB (incin NR)	2,210	4,862
PCB (incin RCRA)	939	2,066
Total	**180,982**	**398,161**
BIOHAZARDOUS		
Infectious Waste	**699**	**1,538**
OTHER		
NR Waste (minus asbestos, PCB, subtitle D, ER, recycled)	317,470	698,434
Non-hazardous Solid Waste (RCRA Subtitle D)	11,160	24,552
Non-RCRA (Generated by ER Project)	36,951	81,292
Used Oil	37,897	83,373
Other (recycled) – various batteries, fluorescent lamps, and non-PCB (ballasts, capacitors, and oils)	73,763	162,279
Total	**477,241**	**1,049,930**
Total Waste and Recyclables Shipped	**1,214,453**	**2,671,797**

NOTES: RCRA = Resource Conservation and Recovery Act
TSCA = Toxic Substances Control Act (primarily regulates asbestos and PCBs)
PCB = Polychlorinated Biphenyl NR = non-regulated
ER = Environmental Restoration kg = kilograms
lbs = pounds

PCB Handling

PCBs are a class of organic chemicals that were widely used in industrial applications due to their practical physical and chemical properties. Use of PCBs included dielectric fluids (used in transformers, capacitors, etc.), hydraulic fluids, and other applications requiring stable, fire-retardant materials. The domestic production and distribution of PCBs was banned in 1979 and their use continues to be phased out.

Sandia Corporation has identified and replaced most PCBs and PCB-containing equipment. The largest source of regulated PCBs that remain in use at SNL/NM are capacitors contained inside fluorescent light ballasts manufactured before July 2, 1979. Other than fluorescent light ballasts, six PCB regulated items remain in use at SNL/NM. Eight areas of existing PCB spill contamination from old transformers that have been removed from service are being actively managed in compliance with an EPA/TSCA use authorization.

In 2005, a total of 7,978 kg (17,552 lb) of PCB waste was shipped (Table 3-2) from the HWMF for disposal and recycle (the majority of PCB waste items came from the ER Project).

Explosive Waste

Explosive waste generated at SNL/NM is generally managed at the point of generation until it can be shipped to a treatment facility. SNL/NM operates the TTF, a unit permitted for the treatment of certain explosive waste streams. In 2005, 998 kg (2,198 lb) of waste was treated in the TTF. In 2005, 13,683 kg (30,138 lb) of other explosive waste was transferred to KAFB for treatment.

3.3.2 Radioactive and MW

The RMWMF and MSB are used to manage LLW, MW, transuranic (TRU) waste, and TRU/MW. The waste processing functions at the RMWMF include waste characterization, segregation, treatment, packaging, storage, and shipment to permitted off-site facilities. Wastes are stored at the MSB.

No high-level radioactive waste (HLW) is generated at SNL/NM. Although Sandia Corporation operates several nuclear reactors, no spent fuel has ever been produced since the original fuel rods are still viable. Furthermore, because SNL/NM is not a power-producing utility, any spent fuel that would eventually be removed from the research reactors would not be classified as HLW.

All LLW, TRU, and MW generators must contact the Radioactive Waste Program before generating waste and obtain prior approval. This will ensure that a proper waste pathway is in place before any waste is generated. The LLW and MW managed at the RMWMF is generated through a variety of processes. During 2005, both LLW and MW consisted of legacy wastes (wastes originally generated between 1990 and 1998), newly-generated wastes from production processes, wastes from ER activities, and wastes generated during waste management activities at the RMWMF. MW also included wastes that had been treated at the RMWMF. TRU and TRU/MW wastes consisted of legacy wastes.

Applicable DOE Orders and regulations for LLW and MW management are listed in Chapter 9. Normally, radioactive waste is shipped off-site within a one-year time frame in accordance with DOE Orders. This is similar to the requirements for hazardous waste and MW. Some LLW may remain on-site longer than one year. Generally, this is due to fully utilizing transport vehicles to ensure that the vehicles are full prior to leaving the site.

2005 Activities at the RMWMF and MSB

In 2005, the RMWMF managed all four waste types (LLW, MW, TRU, and TRU/MW). Wastes were stored at both locations. On-site treatment at the RMWMF included: chemical deactivation (including potential of hydrogen [pH] neutralization), thermal deactivation, stabilization, macroencapsulation, and physical treatment (volume reduction).

In 2005, the RMWMF shipped 46,781 kg (103,133 lb) of LLW, and 97,984 kg (219,017 lb) of MW (8,532 cubic feet) to permitted off-site facilities for treatment and/or disposal. A five-year summary of radioactive waste shipped at SNL/NM during 2005 is shown in Figure 3-1.

In 2005, 2,696 kg (5,944 lb) of MW was treated at the RMWMF to meet applicable hazardous waste treatment standards. Of the treated waste, 2,589 kg (5,708 lb) were rendered non-hazardous. The treated wastes were then stored at the RMWMF or MSB or were shipped to permitted off-site facilities.

TRU and TRU/MW were stored at SNL/NM during 2005. The TRU and TRU/MW will be routed through Los Alamos National Laboratory (LANL) or directly to the Waste Isolation Pilot Plant (WIPP) for final disposal.

3.3.3 MW Regulatory Status

As discussed in Section 2.1.4, Sandia Corporation manages MW that is subject to the FFCO (NMED 2004). The requirements include:

- Deadlines for processing and/or disposing of various types of waste, and

- Providing an annual update of activities and the current inventory of stored waste still onsite.

SNL/NM compliance history regarding MW and the FFCO is shown in Table 9-3.

MW Treatment

Table 9-4 lists the current MW categories (TG-1 to TG-27 including TRU/MW), with the preferred treatment options and the status for each category. Five of the treatment technologies listed in Table 9-4

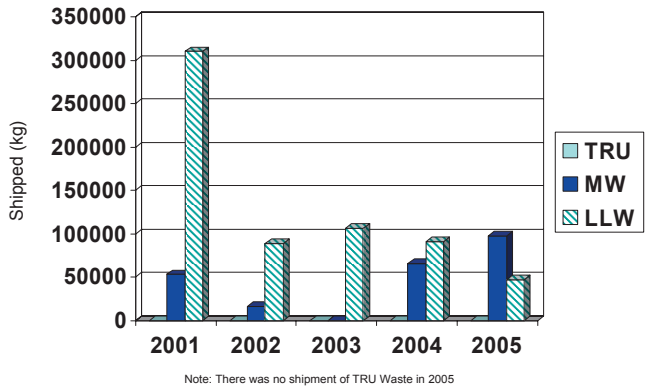
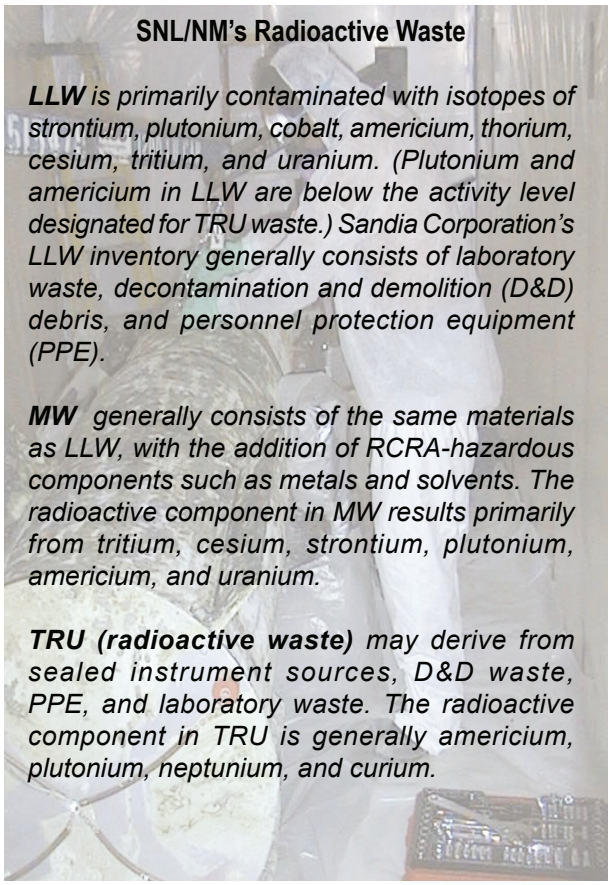


FIGURE 3-1. Five-Year Summary of Total Radioactive Waste Shipped at SNL/NM



are performed on-site at the RMWMF as described in the current RCRA Part B permit request (most recently submitted to NMED in 2005).

MW Inventory in 2005

The majority of MW now being stored on-site consists of inorganic debris and radioactive metallic objects with hazardous waste constituents and wastes that have been treated to meet hazardous waste treatment standards.

3.3.4 Solid Waste

The primary function of the SWTF is to collect, process, and ship for disposal SNL/NM solid waste in compliance with all applicable regulations. The SWTF primarily accepts commercial solid waste. It does not accept hazardous, radioactive, residential, or food service wastes. In support of small SNL/NM construction and demolition projects, the Construction and Demolition (C&D) Recycle Center accepts small quantities of C&D waste, but it is managed separately from the commercial solid waste.

SWTF Operations

Processing commercial solid waste at the SWTF consists of screening 100 percent of the waste for prohibited materials, which are removed if identified. The waste is further screened when it is placed on a conveyor that passes under a radiation detection system. If radiation is detected above background levels, the conveyor is automatically shut down and the source is investigated. (Screening 100 percent of the commercial solid waste is not a requirement of any regulations, and is a good faith effort to prevent prohibited materials from ending up in the landfill.) The conveyor then feeds the waste into a baler where it is compressed into desk sized bales. The bales are weighed, individually tracked, and loaded into a trailer for transport to a local landfill.

The SWTF also processes and ships (but does not collect) commercial solid waste from KAFB and DOE/NNSA. In 2005, the SWTF received 1,170,905 kg (2,579,086 lb) of SNL/NM commercial solid waste and 1,441,723 kg (3,175,602 lb) of KAFB and DOE/NNSA commercial solid waste.

Recyclables

The secondary function of the SWTF is to collect, process (screen, bale, and track), market, and ship the following recyclable materials from SNL/NM: cardboard, white paper, mixed paper, aluminum cans, computers, circuit boards, scrap metals, toner cartridges, and plastics (Table 3-3). Proceeds from the sale of recyclable materials are used to offset recycling program costs. The SWTF also provides some recycling support for KAFB and DOE/NNSA.

The C&D Recycle Center at the SWTF is used to provide contractors of small C&D projects a location to recycle cardboard, wood, and scrap metal. SNL/NM is interested in expanding recycling capabilities to include additional materials as described in Section 3.4.4.

TTF and MSB

The TTF is operated by SNL/NM as a treatment facility for certain explosive waste streams. The MSB stores LLW.

3.4 WASTE MINIMIZATION AND P2 PROGRAMS

3.4.1 Program Scope

The focus of the P2 Program is to reduce resource use and waste generated, and to enhance the overall efficiency of processes and organizations within

SNL/NM. The program focuses on reducing all waste streams, air emissions, water discharges, and hazardous, radioactive, and solid wastes. Additional efforts focus on energy and water conservation as well as reduction of overall impacts to the environment. P2 staff assists various programs at SNL/NM in meeting regulatory goals associated with recycling, waste generation, purchase of material containing recycled content, and reduction of energy use.

The P2 Program forms partnerships with numerous organizations at SNL/NM, including ES&H personnel. P2 also researches waste reduction technologies and products applicable to SNL/NM work processes, performs cost-benefit analyses, and locates funding for new waste reduction processes. Waste minimization and P2 requirements are promulgated by federal EOs as listed in Chapter 9.

P2 Awards

In 2005, SNL/NM received several awards for P2 accomplishments:

EPA WasteWise Award

The EPA selected SNL/NM as "2005 WasteWise Federal Government Honorable Mention" in recognition of accomplishments in the federal government category. The award recognizes noteworthy practices for waste prevention, recycling, and purchasing of recycled-content products. This award specifically recognized SNL/NM for C&D recycling programs, completing a comparison survey of SNL/NM's recycling program with nine other DOE facilities, and purchasing environmentally preferable products for new building construction.

EPA WasteWise Gold Achievement Award in Green Building Category

For the first time SNL/NM received the Waste Wise Gold achievement award in the Green Building category for performance and leadership in the design and construction of resource efficient buildings and for its construction waste management program.

White House Closing the Circle Award

As a result of receiving a DOE Award for Waste/Pollution Prevention Accomplishment in 2004, SNL/

TABLE 3-3. Categories of Waste Recycled at SNL/NM in 2005

Material	Pounds
*** Scrap Metal	1,990,844
** Paper/Cardboard	858,340
* Aluminum Cans	3,034
Used Oil	94,595
Batteries	85,440
Computers	67,400
Tires	12,000
Electric Scrap	35,333
Other (e.g., light bulbs, ballasts, PCB)	51,562
Toner Cartridges	13,339
*** Construction/Remodeling (includes concrete, wallboard, ceiling tiles, wood, carpet, and asphalt)	9,414,860

Icons represent 10,000 lb except where noted * = 1,000 ** = 100,000 *** = 1,000,000

Recycling at SNL/NM

NM was awarded a "White House Closing the Circle Honorable Mention Award" for successes in "Waste Reduction Techniques Applied to Landscaping."

DOE Awards for P2 Accomplishments

For work completed in 2005, SNL/NM received four awards in three categories from the DOE/NNSA P2 Program. Three of the four awards were submitted to be considered for the prestigious "White House Closing the Circle Award" to be announced and presented in 2006.

• Green Purchasing: Comprehensive Environmentally Preferable Purchasing (EPP) Program – A comprehensive EPP program has been implemented that continues to grow and evolve to incorporate new aspects as they are identified. The EPA's Comprehensive Procurement Guidelines regarding recycled-content products, the U.S. Department of Agriculture's (USDA) biobased preferences, and the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) guidelines are used as a starting point for all EPP efforts. The SNL/NM program has three primary elements: procurement green teams; a product review process; and product replacement recommendations. These program elements have facilitated the implementation of environmentally beneficial and financially wise policies and practices.

• Sustainable Design (SD)/Green Buildings: Sustainable Infrastructure/Roofing Program – A roofing program was developed that has demonstrated excellence in the areas of roofing assessment, preventative maintenance, re-roofing, new roofing, and building sustainability. The new roofs will last 15 years longer and are expected to reduce roof maintenance requests by 90 percent.

• Waste/P2: Dirt Road Dust Suppression – SNL/NM has many miles of dirt roads across the site. Several of these roads are on daily or weekly watering schedules to keep the dirt and sand from blowing and causing driving hazards. During 2005, a new product was pilot tested that has the potential to reduce the volume of water used for dust suppression by 5.4 million gallons per year. The results of the pilot test were positive and other projects at SNL/NM are considering using this new technique for dust suppression.

• Waste/Pollution Prevention: Toner Exchange – SNL/NM has created a virtual exchange board to facilitate the internal reuse of excess new printer supplies. Since its inception, the Toner Exchange has garnered praise and popularity with employees as a waste minimizing and cost saving program. In just the first quarter of operation, 289 printer supply parts totaling over $45,000 were reapplied to new users, avoiding the need to acquire duplicate supplies that had already been purchased by SNL/NM.

3.4.2 EPP Program

SNL/NM seeks to purchase environmentally preferable products and employ the most environmentally aware companies. SNL/NM communicates these requirements through its contracts and has issued dedicated contracts to supply some items. When a dedicated contract is not appropriate, EPP requirements are included in Request for Proposals (RFPs) and used to evaluate the award of a contract. Remanufactured toner cartridges, paper and re-refined motor oil are all purchased using dedicated contracts. The toner cartridge and motor oil contracts also require the vendor to collect and recycle their used product.

In 2005, the SNL/NM Green Procurement team asked the Just-In-Time (JIT) office supplies vendor to make it easier to obtain recycled content and EPP products in the SNL/NM JIT ordering system. Improvements to the ordering system are working. For example, previously, SNL/NM's purchases of binders with recycled content were negligible, but now, all standard 3-ring binders purchased are compliant with the mandatory recycled content.

With new biobased purchasing regulations coming from the USDA, SNL/NM is evaluating biobased equivalents to replace petroleum and other chemical-based products currently purchased. These evaluations have resulted in product replacement successes such as the purchase of a new soy-based paint stripper by the SNL/NM Paint Shop (this new product will reduce the use and disposal of harsh chemicals).

SNL/NM recognizes the importance of training and awareness in maintaining high levels of EPP. Therefore, a national expert in the field of Green Purchasing was asked to conduct two days of seminars aimed at a variety of purchasing groups. The national expert worked with SNL/NM project

Recycling Bins at SNL/NM

managers, secretaries, environmental management, and facilities staff to increase knowledge, correct misconceptions, and motivate higher levels of EPP purchases.

In 2005, 93 percent of the construction materials, vehicle products, transportation products, landscape products, park and recreation products, paper products, and non-paper office products purchased by SNL/NM met the EPA's recommendations for recycled content and EPP. A review of the tracking process for capturing all purchase data was completed to identify potential improvements and modified accordingly. As a result, the volume of products tracked increased by 43 percent from 2004.

3.4.3 Sustainable Design (SD)

SD addresses the design of resource productivity and P2 for life cycle savings into a facility's construction and operation. Synonymous with green building and high-performance building, SD strives to balance environmental responsibility, resource efficiency, occupant comfort and well-being, and community sensitivity. Aspects of SD include: proper site selection, energy and water efficiency, environmentally preferable materials; recycling construction waste; and enhancement of the indoor environmental quality through the use of daylighting, elimination of indoor air pollutant sources, and connection to the outdoors.

Integrating SD into construction projects at SNL/NM involves the collaborative effort of project managers, building owners, operations, maintenance personnel, environmental professionals, engineers and architects. Design Team members look at materials, components, and systems from different perspectives and work together for optimum solutions. The solutions are based on the following parameters:

- quality of workplace
- initial cost
- life cycle cost
- overall efficiency
- environmental impact
- productivity
- creativity
- future flexibility

SNL/NM has taken steps to ensure that all construction projects institutionalize SD principles as part of the basic design requirements. Architect and engineering firms are evaluated and chosen to design new facilities partially based on their experience with SD. Construction specifications require the use of environmentally preferable products and the selection of energy and water efficient equipment. At the end of projects, required reports summarize the sustainable elements that were included in the completed building. SNL/NM has implemented SD into recent projects using the USGBC LEED rating system. In 2005, SD was integrated into the following buildings at SNL/NM:

Microsystems and Engineering Sciences Application (MESA) - The MESA project consists of three separate buildings. Two of the structures, a semi-conductor fabrication plant and a laboratory, have been constructed and are in the process of being prepared for occupancy. The third structure, an office building, is still under construction. This 377,000 sq ft complex is projected to have a $1.9 million energy bill and use 100 to 125 million gallons of water annually. Advanced energy efficiency incorporated into the design criteria are expected to reduce energy use by 30 percent. Process water will be recycled and reclaimed, eliminating the need to withdraw additional water from the regional aquifer. The MESA complex features a sustainable landscape that links the buildings together in a campus design. The Design Team also agreed to follow the "Labs for the 21st Century" approach that includes whole building design, lifecycle cost analysis as a decision-making tool, and whole building commissioning. Each building incorporated SD features through an integrated process and will be LEED certified.

Center for Integrated Nanotechnologies (CINT) - Construction has been completed on the CINT, which incorporated sustainability and respect for

New Mexico's cultural past into the buildings operation and architecture. Located outside the secured technical areas, it is a feature building for SNL/NM, emphasizing public/private collaboration on nanotechnology research and education. The building includes a healthy working environment, efficient heating and cooling, environmentally preferable material selection, whole-building commissioning and a landscape that complements the surrounding short grass prairie. LEED certification documentation is currently being compiled for submission to the USGBC and is expected to receive a LEED silver rating.

Small Office Buildings - SNL/NM constructed a number of new small office buildings through customer funded General Plant Projects (GPP) or corporate funded Institutional General Plant Projects (IGPP). Incorporating SD principles and practices previously has been more difficult in these smaller construction projects as they each are independently designed and constructed. Therefore, SNL/NM has streamlined the procurement process for GPP/IGPP building projects through use of design-build contracts. Based on this contracting methodology, SNL/NM has developed Specification Section 01000S, Design-Build Scope and Performance Criteria, that requires the application of specific SD principles as well as submittal documentation demonstrating project-specific results. Specification Section 01000S was successfully applied to four new GPP/IGPP building projects at SNL/NM during 2005.

SNL/NM sponsored a whole-building energy simulation project as part of the Energy Management program. This project involved investigating energy efficiency opportunities associated with typical new office buildings being constructed at SNL/NM to replace temporary office space. Because the new office buildings all have similar performance criteria, SNL/NM had an ideal opportunity to use whole-building energy simulations to baseline and improve the energy performance of existing buildings, and use this information to improve the performance of future buildings. The Energy Simulation program eQUEST™ was used to develop and calibrate a simulation model for a representative office building and evaluate, compare and rank energy conservation opportunities (ECOs) for inclusion into the design and construction of new facilities and the renovation of existing facilities.

3.4.4 Waste Reduction and Recycling

SNL/NM continues to reduce volumes of generated waste and improve recycling programs. Through an analysis known as P2 Opportunity Assessments (PPOA), processes generating wastes are assessed and waste stream methods are established.

The P2 staff teamed with another department to identify more environmentally sound products that could reduce safety hazards and waste associated with two hazardous solvents used in a cleaning process. It was determined that a non-hazardous detergent could provide the same cleanliness as the solvents. The replacement detergent resulted in a $10,400 per year cost savings due to the difference in cost between the detergent and solvents, and there was no hazardous waste as a result of the cleaning process.

SNL/NM Property Reapplication Services receives and redistributes material that is perceived to still have value. Approximately two years ago, a protracted "hold" was in place on materials thought to be contaminated with beryllium dust. In 2005, the material was determined to be contaminant-free, the hold was lifted, but all the material had weathered and aged and was destined for the landfill. A cooperative team was formed to redirect a majority of the material, over 35 tons, from the landfill to be recycled.

Over the past three years, SNL/NM's waste concrete from construction contractors and other on-site projects has been being delivered to the KAFB landfill for stockpiling and eventual crushing. In 2005, a local vendor was contracted to crush all 4,800 tons of material. The crushed concrete was used for erosion control. Although the landfill has been stockpiling SNL/NM's concrete, the P2 team understands that this was a generous gesture on the landfill's part and that the landfill can no longer accept concrete for stockpiling. After evaluating five alternative sites, a remote location for stockpiling concrete/asphalt accumulation was identified on SNL/NM's property. In 2006, the site will be opened to accept concrete and asphalt for recycling.

A marketing program was initiated to raise recycling awareness with small construction project contractors. The SWTF has the C&D Recycling Center for collecting construction/remodeling project waste materials such as scrap metal, wood,

CINT Perspective Approach

wallboard, carpet, cardboard, and wire. The marketing program was used to inform construction contractors about the facility location, layout, materials that are accepted, and to encourage them to use the facility rather than sending the materials to a landfill.

Site-wide recycling awareness continues in an ongoing campaign as articles discussing aspects of the recycling program are routinely published in on-site publications. In 2005, 200 pledges were submitted by individuals to increase their recycling efforts.

As described under the Waste Management sections of this chapter, SNL/NM routinely recycles a variety of materials at our waste management facilities. Additionally, Fleet Services sends tires to be retreaded and the facilities department sends construction materials and demolished building components for recycling. Computers that are usable are donated to local schools and toner cartridges are sent for remanufacturing. Table 3-3 summarizes the quantities of materials that SNL/NM recycled during 2005 in all categories. In 2005, 52 percent of routinely generated materials that could have become solid waste disposed in a landfill were diverted for recycling.

3.5 BIOLOGICAL CONTROL ACTIVITIES

The Biological Control Activity provides customer support related to animal control issues and compiles information on pesticide use at SNL/NM. Animal control support includes providing general information and resolving issues related to removing nuisance animals. Requests for assistance in resolving nuisance animal problems are relayed and documented through Sandia Corporation's Facilities Telecon Organization. This effort may entail interfacing, as necessary, with U.S. Air Force (USAF) and State of New Mexico agencies to resolve animal control issues. The Biological Control Activity also involves providing support in addressing animal-borne disease concerns (e.g., Hantavirus) through activities such as disinfecting, sanitizing, and cleanup of areas infested with rodents or pigeons.

Pesticide use at SNL/NM includes the use of herbicides for weed control, rodenticides for controlling mice, and insecticides for the control of insects in food service and work areas. Sandia Corporation uses EPA-registered pesticides that are applied by certified pest control agencies. Material Safety Data Sheets (MSDSs) and product labels for pesticides used at SNL/NM are maintained under the program. Pesticide use (product names and amounts applied) is documented in quarterly reports. Documents related to the program are listed in Chapter 9.

3.6 NEPA COMPLIANCE ACTIVITIES

NEPA Compliance Program

Sandia Corporation provides DOE/NNSA/SSO with technical assistance supporting compliance with NEPA and the National Historic Preservation Act (NHPA). Under a self-managed program, the SNL/NM NEPA Team reviews projects for conformance to existing DOE NEPA documents and determinations. The use of the ISMS NEPA Module software facilitates SNL/NM NEPA Compliance Reviews, citing existing NEPA documentation as appropriate. The NEPA Module also streamlines DOE/NNSA/SSO's review and approval of NEPA compliance, when required, and supports quality assurance by providing a consistent framework that makes NEPA compliance documentation and information readily available. For some projects, a NEPA Compliance Review or an Air Force Form 813 is prepared for DOE review and determination, if the proposed action:

(1) Does not fall within the analysis of an existing SNL/NM NEPA document, or

(2) Would occur on USAF property (permitted, or requested to be permitted, for SNL/NM use).

NEPA program documents and regulations are listed in Chapter 9.

Part of the self-managed NEPA program at SNL/NM includes the training and employing of Qualified NEPA Reviewers (QNRs), who are usually ES&H Coordinators. Once qualified and approved by DOE/NNSA/SSO, QNRs use the ISMS NEPA Module software (under supervision of the NEPA Team) to review proposed project activities against existing NEPA assessments and reviews, becoming expert in the process on environmental aspects and impacts associated with their organizations.

SNL/NM SWEIS

Consistent with its NEPA regulations, DOE prepares a Site-Wide Environmental Impact Statement (SWEIS) for its large, multiple-facility sites. In November 1999, DOE issued the final SWEIS for SNL/NM (DOE 1999a), and in December 1999, issued the Record of Decision (ROD) selecting "Expanded Operations" as the preferred alternative for assessing the environmental impacts of SNL/NM operations.

The SWEIS allows DOE to "tier" subsequent NEPA documents to the larger analysis and reduce the need for new impact analysis for project work consistent with activities analyzed in the SWEIS. In accordance with the agency's regulations (10 CFR 1021), DOE will complete a five-year assessment of the SWEIS in 2006 to determine whether the analysis continues to cover SNL/NM operations, or if a new or supplemental SWEIS should be prepared.

2005 NEPA Documentation

In 2005, the NEPA Team compiled 2004 data to support the five-year SWEIS assessment. In June 2005, DOE issued a finding of no significant impact (FONSI) for the environmental assessment (EA) of the Proposed Consolidation of Neutron Generator Tritium Target Loading Production at SNL/NM (DOE/EA-1532).

SNL/NM performed a total of 1,118 NEPA compliance reviews, transmitting 78 NEPA checklists to DOE/NNSA/SSO for review and determination. Summary data for SNL/NM NEPA reviews performed in 2005 are detailed in Table 3-4.

3.7 ENVIRONMENTAL EDUCATION OUTREACH PROGRAM

Sandia Corporation's Environmental Education Outreach Program reaches out to the community at large. Presentations on both local and national environmental issues and concerns are held at community centers, schools, and environmental conferences. The hands-on approach is used wherever feasible, such as involving the community and students in field trips to perform environmental sampling, conducting in-field measurements, and observing local ecological systems.

In 2005, Sandia Corporation participated in the following events:

- The School to World Conference
- Dia del Rio at the Albuquerque Aquarium
- School presentations throughout Albuquerque
- The New Mexico Environmental Health Conference.

Sandia Corporation also co-sponsors the Annual Youth Conference on the Environment. Additional sponsors included the Environmental Education Association of New Mexico (EEANM), and the City of Albuquerque's South Broadway Cultural Center. The 2005 conference theme was "Alternative Energy: Fuels for the Future." Students attended a "Nuclear Energy" panel discussion during which representatives from government, business, and environment shared their viewpoints regarding nuclear energy's ability to provide clean energy versus the controversy of nuclear power. Students also attended breakout sessions addressing wind-turbines, geothermal energy, and solar energy.

For additional information, please visit the website:

http://www.sandia.gov/ciim/ASK/html/elementary/environment.htm

TABLE 3-4. Summary Data for SNL/NM NEPA Compliance Reviews Performed in 2005

NEPA Reviews	Review Breakouts	Quantity
NEPA Module Reviews[1]	Total Reviewed by NEPA Team	892
	DOE Checklist Submittals[2]	71
EDP Reviews[3]	Total Reviewed by NEPA Team	106
	DOE Checklist Submittals[2]	7
	SNL/NM Reviews (Total)	1,076
Air Force (AF) NEPA Reviews[4]	Land Use Permit Renewals	18
	Land Use Permit Terminations	4
	Land Use Permit Modifications	20
	AF-813 Submittals (Total)	42
GRAND TOTAL of ALL NEPA REVIEWS		1,118
PERCENTAGE of TOTAL REVIEWS REQUIRING SUBMITTAL to DOE[5]		7.25 percent
Verification of Work For Others (WFO) NEPA Citations[6]		579

NOTES:
[1]SNL reviews cite existing NEPA documents; where existing documents are not available, NEPA checklists are prepared and submitted to DOE. Environmental Restoration (ER) reviews are now included in the Total Reviewed by NEPA Team.
[2]These are proposed projects that, after initial review, needed to be transmitted to DOE for review.
[3]Experiment Development Plan (EDP): An electronic system used by the Albuquerque Full-Scale Experimental Complex (AFSEC) to record project information, including NEPA reviews. DOE/SSO has approved the EDP review process to be equivalent to the NEPA module reviews. The NEPA Team subsequently reviews all EDPs.
[4]The NEPA Team, in cooperation with the project originator, prepares all Air Force NEPA documents.
[5]Represents a percentage of only DOE NEPA reviews (1,076) because all Air Force NEPA documents must be transmitted through DOE/SSO to the U.S. Air Force.
[6]SNL/NM supports DOE/SSO in verifying WFO NEPA citations accompanying funding requests.

chapter four
TERRESTRIAL AND ECOLOGICAL SURVEILLANCE

In This Chapter ...

Environmental Snapshot

Sandia National Laboratories, New Mexico conducts statistical analyses to compare the results from on-site and perimeter terrestrial surveillance samples to off-site results, and to establish trends in order to identify possible pollutants and their potential impact on human health or the environment.

4.1 TERRESTRIAL SURVEILLANCE PROGRAM

Terrestrial surveillance is conducted at Sandia National Laboratories, New Mexico (SNL/NM) to detect the possible deposition of or migration of contaminants to off-site locations and to determine the impact, if any, of SNL/NM's operations on human health or the environment.

The Terrestrial Surveillance Program samples surface soils, arroyo and river sediments, and vegetation from various on-site, perimeter, and off-site locations to detect if radiological and non-radiological constituents are present.

The number of sampling locations has increased to account for the growth of the laboratory. Several other significant programmatic changes have occurred over the years and are documented in this chapter.

4.1.1 Program Objectives

The Terrestrial Surveillance Program is designed to meet the objectives of the U.S. Department of Energy (DOE) Order 450.1, *Environmental Protection Program* (DOE 2005):

- Collect and analyze samples in order to characterize environmental conditions and identify trends;
- Establish baseline (or background) levels of radiological and non-radiological constituents;
- Assess the effectiveness of pollution prevention (P2) and abatement programs;
- Identify new or existing environmental quality problems, and their potential impacts on human health or the environment; and
- Verify compliance with applicable laws and regulations, as well as commitments made in official documents (such as Environmental Impact Statements [EISs], in accordance with the National Environmental Policy Act [NEPA]).

Standards for Comparison

No regulatory limits are available to directly compare concentrations of radiological or non-radiological constituents in surface soils, vegetation, or sediments; however, SNL/NM conducts statistical analyses to compare the results from on-site and perimeter samples to off-site results, and to establish trends in order to identify possible pollutants and their potential impact on human health or the environment.

In addition, sample results for metals in surface soils are compared to U.S. surface soil average concentrations, published in Trace Elements in Soils and Plants (Kabata-Pendias 2000), or local/regional surface soil average concentrations, published in Elements in North American Soils (Dragun and Chekiri 2005), or site-specific surface soil concentrations (Dinwiddie 1997). These results are tabulated in Table 4-8. A summary report of metals-in-soil at SNL/NM collected annually between 1993 and 2005 has been prepared and will serve as another point of reference (SNL 2006a). In the future, routine sampling at the fixed locations outlined in this report will no longer be conducted. Instead, special sampling efforts will be conducted in specific areas of interest in the vicinity of activities with potential environmental impact.

The DOE Oversight Bureau of the New Mexico Environment Department (NMED) split samples with SNL/NM, at several locations, for an added measure of verification.

Statistical Analysis

Samples are generally collected from fixed locations to effectively enable statistical comparisons with results from previous years. Statistical analyses are performed to determine if a specific on-site or perimeter location differs from off-site values, and to identify trends at a specific sampling location. Since multiple data points are necessary to provide an accurate view of a system, the Terrestrial Surveillance Program does not rely on the results from any single year's sampling event to characterize on-site environmental conditions. Results from a single sampling point may vary from year to year, due to slight changes in sampling locations, differences in climatic conditions, and laboratory variations or errors. Therefore, as the amount of data increases, the accuracy of the characterization increases.

The results of the statistical analyses allow SNL/NM to prioritize sample locations for possible follow up action. The prioritization process is a decision making tool to assist in determining the appropriate level of concern for each sample result.

The Statistical Analysis Prioritization Methodology (Shyr, Herrera, and Haaker 1998) is based on two "yes or no" questions resulting in a matrix of four priority levels. The matrix is shown in Table 4-1. In addition, a qualitative, visual inspection of a graphical presentation of the data is conducted to compare sampling results to regional/local and site-specific concentrations. This step is performed to ensure that anomalous data that would otherwise pass statistical scrutiny is flagged for further investigation.

Beginning in 2001, the analysis was limited to a five-year period. The reason for the change was that SNL/NM changed analytical laboratories in 2000, with lower detection capabilities for many of the metals. As a result, a large number of false decreasing trends were noted for non-radiological parameters when the whole data set was analyzed. By limiting the analysis to a five-year period, the trend analyses will be more meaningful. The analysis in 2005 utilized data from the same analytical laboratory for the five-year period.

4.1.2 Sample Media

Samples of surface soils, arroyo and river sediments, and vegetation are collected as part of the Terrestrial Surveillance Program, and analyzed for radiological and non-radiological constituents.

Soil

Soil samples are collected to ascertain the presence, or buildup, of pollutants that may have been transported by air or water, and deposited on the ground surface. Approximately 1,500 grams (g) of sample is collected from the top two inches of soil in accordance with SNL/NM field operating procedures. In 2005, one new on-site soil location (86, Wyoming and "S" Street) was added, which replaced location 20 (samples still collected in 2005, but discontinued hereafter). Sampling at location 65E has been discontinued because of encroaching residential development and lack of access. It is redundant to location 73, Tijeras Arroyo – Up-gradient. Hence, it will not be relocated. Locations 32E and 32S were once near a former facility in Technical Area (TA) II. This facility was removed by the SNL/NM decontamination & demolition (D&D) Project. Hence, no further monitoring will be conducted at these locations. In 2005, soil samples were collected from locations indicated in Tables 4-2, 4-3 and 4-4.

Sediment

Sediment samples are collected from arroyo beds and from the banks of rivers and creeks to ascertain the presence, or buildup, of pollutants deposited from surface waters. Approximately 1,500 g of sample is collected from the top two inches of soil in accordance with SNL/NM field operating procedures. Sediment samples were collected from locations indicated in Tables 4-2, 4-3 and 4-4.

Vegetation

Vegetation is sampled to monitor for potential uptake of pollutants, which could provide an exposure pathway to foraging animals, as well as to humans through the food chain. In actuality, human exposure to contaminants through the food chain is highly unlikely on Kirtland Air Force Base (KAFB), since there is no hunting, livestock or commercial farming

TABLE 4-1. Decision Matrix for Determining Priority Action Levels

Priority	Are results higher than off-site?*	Is there an increasing trend ?	Priority for further investigation
1	**Yes**	**Yes**	Immediate attention needed. Specific investigation planned and/or notifications made to responsible parties.
2	**Yes**	No	Some concern based on the level of contaminant present. Further investigation and/or notifications as necessary.
3	No	**Yes**	A minor concern since contaminants present are not higher than off-site averages. Further investigation and/or notifications as necessary.
4	No	No	No concern. No investigation required.

NOTES: Based on Statistical Analysis Prioritization Methodology (Shyr, Herrera, and Haaker 1998).
*While some sites may appear higher than off-site, there may not be a statistically significant difference.

within the boundaries of the base. Approximately 500 g of sample is collected, preferably from perennial grass, by cutting back several inches of growth from the plant. If grass is not available, samples from small leafy plants may be collected. In 2005, vegetation was collected from locations indicated in Tables 4-2, 4-3 and 4-4.

Gamma Radiation Levels

Gamma radiation levels are measured using Thermoluminescent Dosimeters (TLDs) to determine the impact, if any, of SNL/NM's operations on ambient radiation levels. The TLDs are changed out on a quarterly basis and processed at an on-site laboratory. TLDs were collected from locations indicated in Tables 4-2, 4-3 and 4-4.

4.1.3 Sampling Locations

To the extent practical, sampling locations are consistent from year to year in order to establish trends. Occasionally, sampling locations are added or dropped for different reasons, including start-up of a new facility or operation; closure of an existing facility or operation; additional characterization of areas with elevated concentrations or increasing trends; or other technical or budgetary reasons. These locations are shown in Figure 4-1. Locations sampled are shown in Tables 4-2 through 4-4. In 2005, one on-site soil sampling location was added (location 86) to replace location 20. This new location will provide for continued monitoring of TA-IV but without interference from trace amounts of residual lead in the soil that originated from the nearby Skeet Range (which has been closed). The complete evaluation and rationale for this change is documented in an internal memorandum (SNL 2005o). Since only one sample has been collected at this location, no statistical analyses were performed using this data.

On-site

On-site locations (Figure 4-1 and Table 4-2) are selected within or near areas of past or current SNL/NM operations. Sample locations are chosen near sites with known contamination from past operations, and near facilities that have the potential to discharge radiological or non-radiological pollutants to the environment. Other considerations in the selection of sampling locations include local topography and meteorology.

Perimeter

Perimeter locations (Figure 4-1 and Table 4-3) are selected to determine if contaminants are migrating from SNL/NM sites toward the off-site community. Perimeter locations are typically off of SNL/NM property, but (with few exceptions) within the boundary of KAFB.

Off-site

Off-site locations (Figure 4-2 and Table 4-4) are selected to establish concentrations of radiological and non-radiological constituents for comparison with on-site and perimeter results. Sample locations have been selected within a 25-mi radius of SNL/NM in areas where the accumulation of pollutants is expected to be minimal.

4.1.4 Radiological Parameters and Results

Radiological analyses are performed on all soil, sediment, and vegetation samples and are summarized in this section. The 2005 radiological parameters and analytical results are found in Appendix C of this report. The detailed statistical analyses are documented in 2005 Data Analysis in Support of the Annual Site Environmental Report (SNL 2006c). It was decided that tritium would not be collected from the soil samples due to the low moisture content.

Radiological Results

The results of the statistical analysis showed no on-site or perimeter soil, sediment, or vegetation locations that were Priority-1 (both higher than off-site and with an increasing trend). Three locations were identified as Priority-2 (higher than off-site) and one location was identified as Priority-3 (increasing trend). The Priority-2 and Priority-3 locations and parameters are listed in Tables 4-5 and 4-6.

Cesium-137

Two perimeter locations (12 and 64) continue to be identified as Priority-2 for Cesium-137 in surface soils. Location 12 is located on the U.S. Forest Service (USFS) land withdrawn area. Location 64 is located north of Manzano Base, near the KAFB boundary. These locations are at slightly higher elevation, which receive greater precipitation, which results in slightly higher Cesium-137 levels from fallout. Cesium-137 is prevalent in surface soils worldwide as a result of historical nuclear weapons testing. Over the past five years, the values for Cesium-137 at these perimeter locations ranged

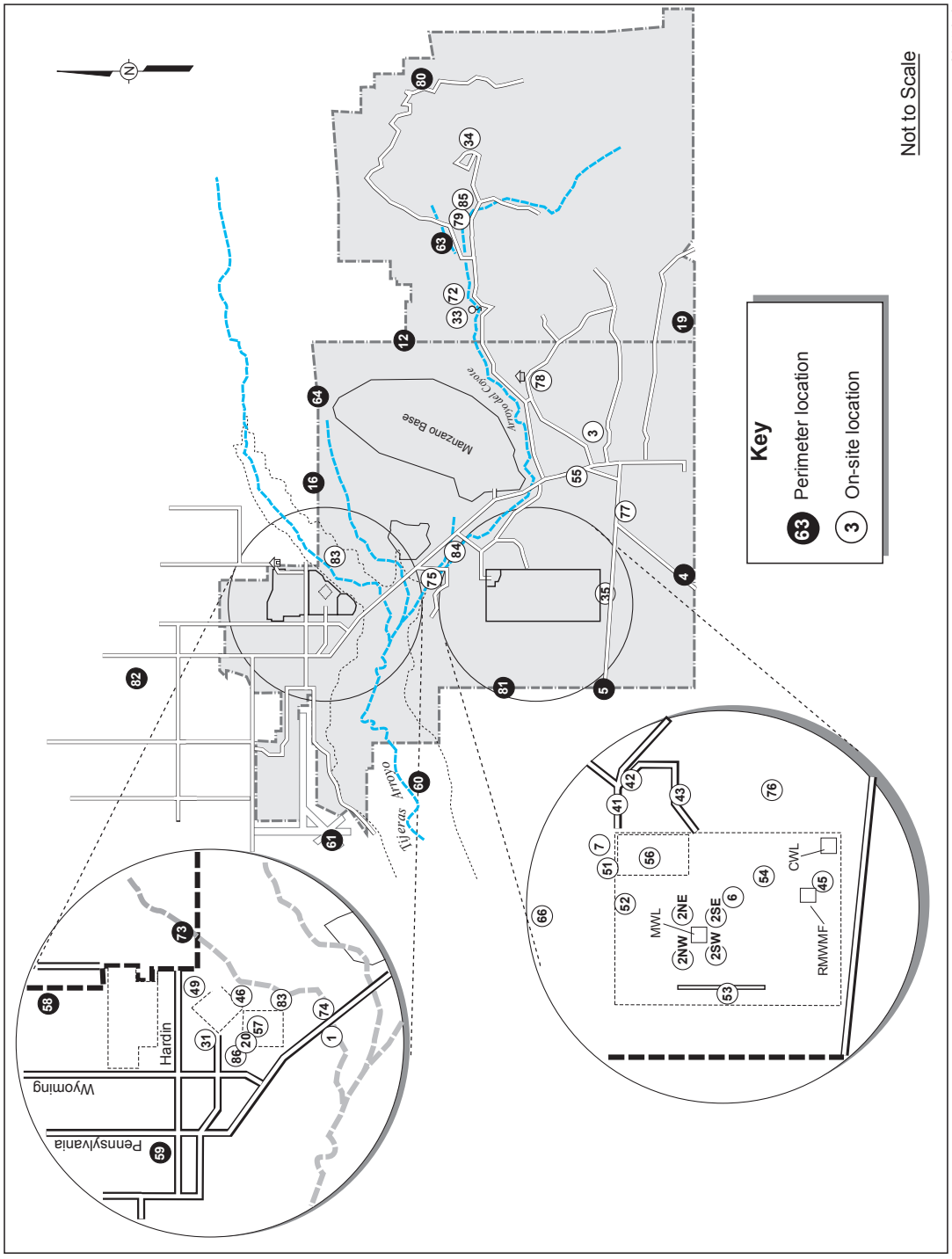


FIGURE 4-1. Terrestrial Surveillance Program On-site and Perimeter Sampling Locations

On-site locations are within areas of SNL/NM operations. Perimeter locations are located both on and off KAFB property.

TABLE 4-2. On-site Terrestrial Surveillance Locations and Sample Types

Location Number	Sampling Location	Soil	Sediment	Vegetation	TLD
1	Pennsylvania Ave.	X			X
2NW	Mixed Waste Landfill (MWL) (northwest)	X		X	X
2NE *	MWL (northeast)	X		X	
2SE	MWL (southeast)	X			
2SW	MWL (southwest)	X			
3	Coyote Canyon Control	X			X
6	Tech Area (TA) III (east of water tower)	X		X	X
7 *	Unnamed Arroyo (north of TA-V)	X			X
20*	TA-IV (southwest) (KAFB Skeet Range)	X		X	X
31	TA-II Guard Gate				X
33	Coyote Springs	X		X	
34	Lurance Canyon Burn Site	X		X	
35	Chemical Waste Landfill (CWL)	X		X	
41	TA-V (northeast fence)	X			X
42	TA-V (east fence)	X		--	X
43	TA-V (southeast fence)	X		X	X
45	Radioactive and Mixed Waste Management Facility (RMWMF), TA-III (northwest corner)	X		X	X
45E	RMWMF, TA-III (east fence)				X
46	TA-II (south corner)	X		X	X
47	Tijeras Arroyo (east of TA-IV)				X
48	Tijeras Arroyo (east of TA-II)				X
49	Near the Explosive Components Facility (ECF)	X		--	
51	TA-V (north of culvert)	X		X	
52	TA-III, northeast of Bldgs. 6716 and 6717	X		X	
53 *	TA-III south of long sled track	X			
54	TA-III, Bldg. 6630	X			
55	Large Melt Facility (LMF), Bldg. 9939	X		X	
56	TA-V, Bldg. 6588 (west corner)	X			
57	TA-IV, Bldg. 970 (northeast corner)	X			
66	KAFB Facility	X		--	X
72	Arroyo del Coyote (midstream)		X		
74N	TA-IV, Tijeras Arroyo (midstream)		X		
75	Arroyo del Coyote (down-gradient)		X		
76	Thunder Range (north)	X			
77	Thunder Range (south)	X			
78	School House Mesa	X			
79	Arroyo del Coyote (up-gradient)	X	X		
83	Tijeras Arroyo GW Well		X		
84	Storm Water Monitoring Point (SWMP)-10		X		
85	Arroyo del Coyote Cable Site		X		
86	Corner of Wyoming and "S" Street	X		X	X

NOTES: *Replicate sampling locations: In addition to single samples taken for each medium, two replicate samples are collected for internal checks on comparability of sampling and analysis.

TLD = thermoluminescent dosimeter

-- indicates that no sample was collected during the 2005 sampling period.

TABLE 4-3. Perimeter Terrestrial Surveillance Locations and Sample Types

Location Number	Sampling Location	Soil	Sediment	Vegetation	TLD
4	Isleta Reservation Gate	X		X	X
5	McCormick Gate	X		X	X
12	Northeast Perimeter	X		--	
16	Four Hills	X			X
18	North Perimeter Road				X
19	USGS Seismic Center Gate	X		X	X
39	Northwest DOE Complex				X
40	Tech Area I, northeast (by Bldg. 852)				X
58	North KAFB Housing	X		--	
59	Zia Park (southeast)	X			
60	Tijeras Arroyo (down-gradient)	X	X	X	
61	Albuquerque International Sunport (west)	X			
63	No Sweat Boulevard	X		X	
64 *	North Manzano Base	X		X	
73 *	Tijeras Arroyo (up-gradient)		X		
80	Madera Canyon	X			
81	KAFB West Fence	X			X
82	Commissary	X		X	

NOTES: *Replicate sampling locations: In addition to single samples taken for each medium, two replicate samples are collected for internal checks on comparability of sampling analysis.
TLD = thermoluminescent dosimeter
-- indicates that no sample was collected during the 2005 sampling period.

TABLE 4-4. Off-site Terrestrial Surveillance Locations and Sample Types

Location Number	Sampling Location	Soil	Sediment	Vegetation	TLD
8	Rio Grande, Corrales Bridge (up-gradient)	X	X	X	
9	Sedillo Hill, I-40 (east of Albuquerque)	X		X	
10	Oak Flats	X		--	X
11 *	Rio Grande, Isleta Pueblo (down-gradient)	X	X	X	X
21	Bernalillo Fire Station 10, Tijeras				X
22	Los Lunas Fire Station				X
23	Rio Rancho Fire Station, 19th Ave.				X
24	Corrales Fire Station				X
25	Placitas Fire Station	X		X	X
26	Albuquerque Fire Station 9, Menaul NE				X
27	Albuquerque Fire Station 11, Southern SE				X
28	Albuquerque Fire Station 2, High SE				X
29	Albuquerque Fire Station 7, 47th NW				X
30	Albuquerque Fire Station 6, Griegos NW				X
62	East resident	X		X	
68	Las Huertas Creek		X		

NOTES: *Replicate sampling locations: In addition to single samples taken for each medium, two replicated samples are collected for internal checks on comparability of sampling and analysis.
TLD = thermoluminescent dosimeter
-- indicates that no sample was collected during the 2005 sampling period.

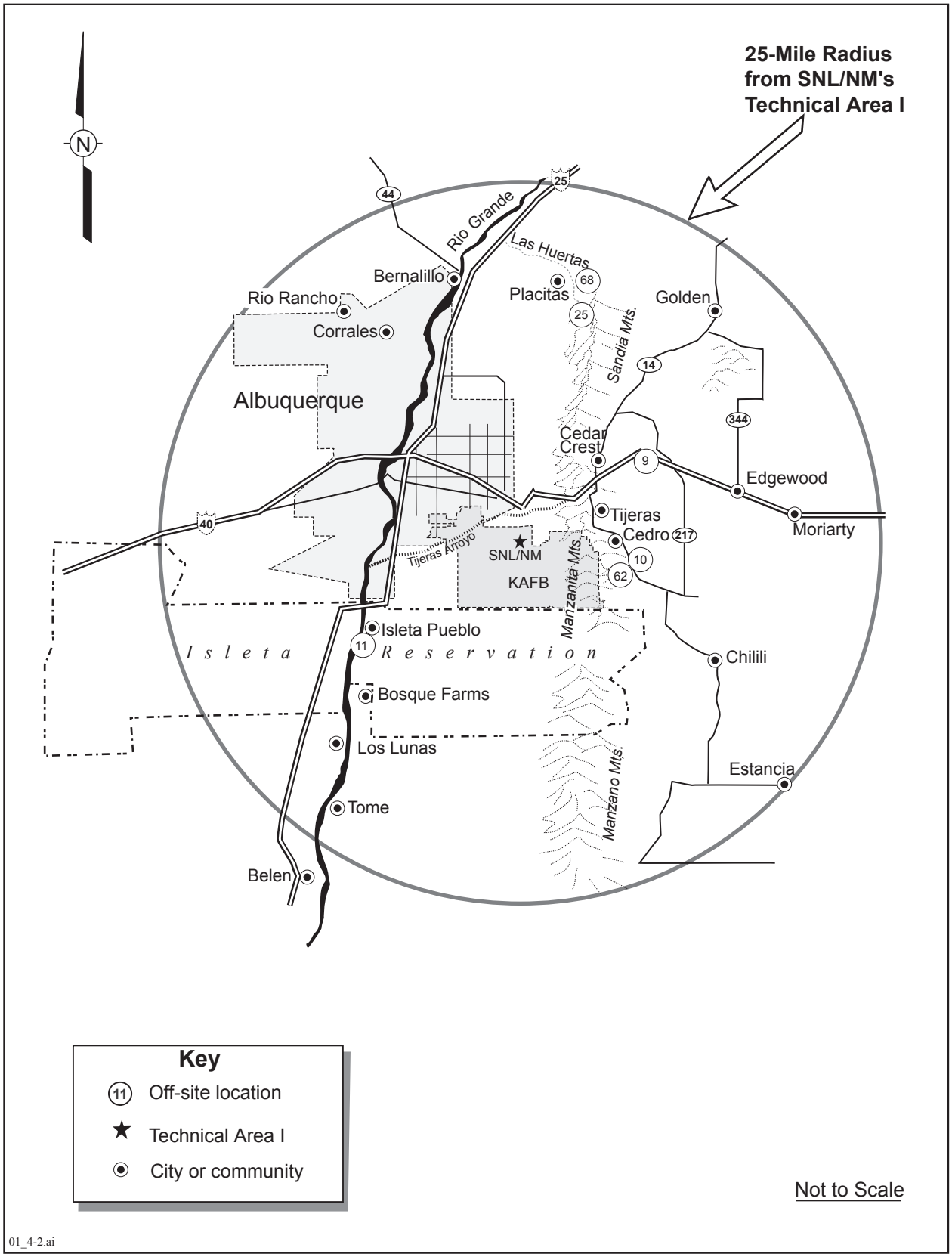


FIGURE 4-2. Terrestrial Surveillance Program Off-site Sampling Locations

from 0.47to 1.54 picocurie per gram (pCi/g). These levels are not cause for concern.

One perimeter location (81) was identified as Priority-3 (increasing trend) for Cesium-137 in surface soils. Location 81 is located at the KAFB West Fence, which is west of TA-III. Over the past four years, the values for Cesium-137 have ranged from 0.43 to 0.671 pCi/g (note: sampling did not begin at this location until 2002).

All sediment and vegetation sample locations were identified as Priority-4 (consistent with off-site results, and no increasing trends) for Cesium-137.

Tritium

Due to the drought, many of the soil samples collected had such low soil moisture content that meaningful tritium in soil moisture measurements were frequently not possible. Tritium is not a significant indicator radionuclide for operations at SNL/NM and the low soil moisture in the area will always make low activity assay difficult.

All soil, sediment and vegetation sample locations were identified as Priority-4 (consistent with off-site results, and no increasing trends) for tritium.

Total Uranium

There was one on-site location (79) identified as Priority-2 (higher than off-site) for sediment. Location 79 is located up-gradient in the Arroyo del Coyote. The values observed at this location ranged from 1.10 to 1.58 mg/g. This location is at a higher elevation, where slightly higher natural concentrations are expected. The levels are not cause for concern.

All vegetation sample locations as well as the remaining soil and perimeter sampling locations were identified as Priority-4 (consistent with off-site values and no increasing trends).

TLDs

TLD exposure by quarter and exposure rate for each location class for 2005 is shown in Appendix C. The exposure rate summary statistics for each location class are also presented in Appendix C. In 2005 all TLDs were collected for every quarter. If a TLD is missing a quarter, it is excluded from the statistical analysis.

Data for 2001 through 2005 were analyzed to determine if any statistical differences were observed for either location class (on-site, perimeter, or community) or year. If a TLD was missing a quarter in any of the five years of interest, it was deleted from the analysis. Operational locations are also excluded from the statistical analysis. The statistical analysis showed three distinct groupings: 2005 was greater than 2003, which was greater than 2002, 2004, and 2001 combined. There was no statistical difference between on-site, perimeter, or off-site locations. Table 4-7 shows the overall exposure rate summary statistics for 2001-2005. Figure 4-3 shows the TLD exposure rates by year and location class.

TABLE 4-5. Radiological Results Summary Statistics for Sample Locations (2001-2005) noted as PRIORITY-2 During 2005

Sample Media	Analyte	Units	Location	Sample Size	Average	Median	Std Dev	Min	Max
Soil	Cesium-137	pCi/g	12	5	0.98	0.96	0.50	0.49	1.54
			64	5	0.71	0.57	0.31	0.47	1.24
Sediment	Total Uranium	mg/g	79	4	1.37	1.41	0.20	1.10	1.58

NOTES: Std Dev = Standard deviation
pCi/g = picocurie per gram
mg/g = microgram per gram

TABLE 4-6. Radiological Results Summary Statistics for Sample Locations (2001-2005) noted as PRIORITY-3 During 2005

Sample Media	Analyte	Units	Location	Sample Size	Average	Median	Std Dev	Min	Max
Soil	Cesium-137	pCi/g	81	4	0.553	0.554	0.112	0.431	0.671

NOTES: Std Dev = Standard deviation
pCi/g = picocurie per gram
mg/g = microgram per gram

TABLE 4-7. Summary Statistics for TLD Exposure Rates, 2001 - 2005

Location Class	No. of Obs	Units	Mean	Median	Std Dev	Min	Max
Community	55	mR/hr	95.3	91.4	14.3	76.2	147.6
Perimeter	38	mR/hr	98.0	97.9	11.6	80.2	132.2
On-Site	66	mR/hr	97.0	95.3	8.8	83.2	118.3

NOTES: Std Dev = Standard deviation
mR/hr = microroentgen per hour (10^{-6} roentgen per hour)

4.1.5 Non-Radiological Parameters and Results

The only non-radiological samples collected in 2005 were follow-up samples for lead in soil found at location 20. These results are found in Appendix C. The complete evaluation and summary of the residual lead in soil (due to previous operation of the nearby Skeet Range is documented in an internal memorandum (SNL 2005o).

Additional investigation into the elevated levels of iron in soil at location 65E confirmed past experience that higher iron levels are frequently found in sample locations at higher elevations and in the foothills of the Sandias. In lieu of the routine sampling at all locations for non-radiological parameters, a summary report of all non-radiological results has been prepared to serve as a baseline for future reference regarding non-radiological constituents in soil at SNL/NM (SNL 2006a).

4.2 ECOLOGICAL SURVEILLANCE

Biota monitoring began in 1996 as an additional element of environmental monitoring within the Terrestrial Surveillance Program. The objectives of the Ecological Surveillance Program are to:

• Collect ecological resource inventory data to support site activities while preserving ecological resources, and to maintain regulatory compliance;

• Collect information on plant and animal species present to further the understanding of ecological resources on site;

• Collect biota contaminant data on an as needed basis in support of site projects and regulatory compliance;

• Assist SNL/NM organizations in complying with regulations and laws;

• Educate the SNL/NM community regarding ecological resource conservation; and

• Support line organizations with biological surveys in support of site activities.

The biota data collected are a part of the suggested requirements under DOE Order 450.1 (DOE 2005). Data are collected on mammal, reptile, amphibian, bird, and plant species currently inhabiting SNL/NM. Data collected includes information on presence, abundance, species diversity, and land use patterns. No contaminant analysis of radionuclides and metals on wildlife were performed in 2005. Table 1-1 represents common species identified at KAFB.

These data are primarily utilized to support NEPA documentation and land use decisions on a corporate level. Data also support wildlife communication campaigns to ensure safe work environments and sustainable decision making strategies.

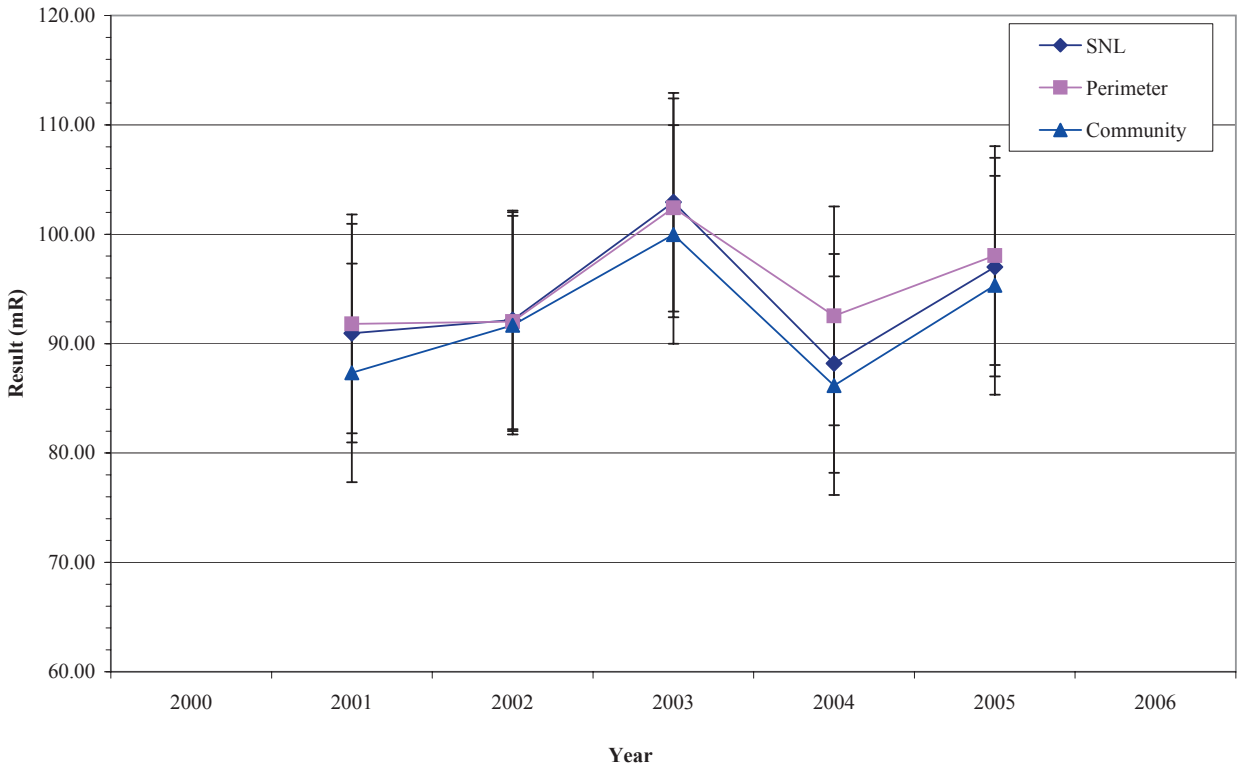


FIGURE 4-3. TLD Exposure Rates by Year and Location Class

TABLE 4-8. Metal in Soil Concentration Data (compiled from various sources)

		NM Soil Concentrations		NMED Soil Screening Levels		US Soil Concentrations	
Analyte	**ER Background**	**Lower Limit**	**Upper Limit**	**Residential**	**Industrial**	**Lower Limit**	**Upper Limit**
Aluminum		5000	10000	74000	100000	4500	100000
Antimony	3.9	0.2	1.3	30	92	0.25	0.6
Arsenic	5.6	2.5	19	4	17	1	93
Barium	200	230	1800	5200	15000	20	1500
Beryllium	0.8	1	2.3	150	440	0.04	2.54
Cadmium	1	ND	11	70	190	0.41	0.57
Calcium		600	320000				
Chromium	17.3	7.6	42	230	660	7	1500
Cobalt	7.1	2.1	11	4500	13000	3	50
Copper	17	2.1	30	2800	8500	3	300
Iron		1000	100000	23000	69000	5000	50000
Lead	39	7.8	21	400	1000	10	70
Magnesium		300	100000				
Manganese		30	5000	7800	14000	20	3000
Mercury	0.25	0.01	0.06	7	20	0.02	1.5
Molybdenum		1	6.5	380	1200	0.8	3.3
Nickel	25.4	2.8	19	1500	4400	5	150
Potassium		1900	63000				
Selenium	1	0.2	0.8	380	1200	0.1	4
Silica (Silicon)		150000	440000			24000	368000
Silver	1	0.5	5	380	1200	0.2	3.2
Sodium		500	100000				
Strontium		88	440	37000	89000	7	1000
Thallium	1.1			6	18	0.02	2.8
Titanium	10	910	4000			20	1000
Vanadium	33	15	94	530	1600	0.7	98
Zinc	76	18	84	23000	69000	13	300

NOTES: ND = not detectable

chapter five

AIR QUALITY COMPLIANCE AND METEOROLOGICAL MONITORING

Environmental Snapshot

In 2005, a 30-meter tower was constructed from the old 50-meter tower, and erected approximately one-half mile from the A15 site. The new tower will meet the needs of the expanding laboratory and can be used to reflect meteorological conditions of the Sandia National Laboratories, New Mexico facilities just outside of the Eubank gate.

In This Chapter ...

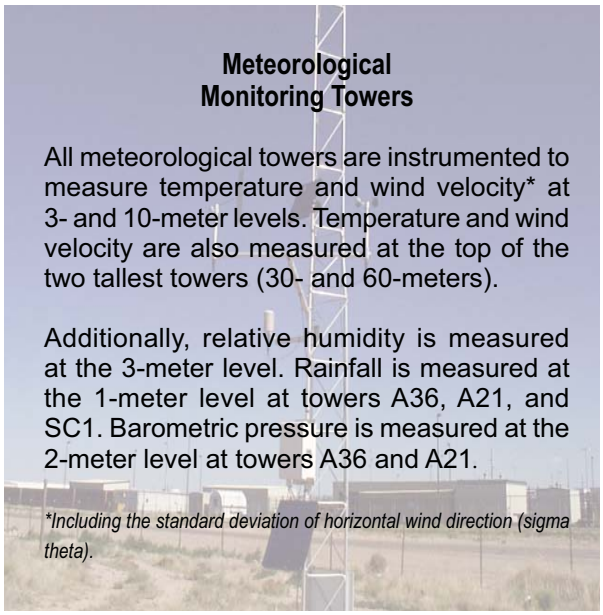
Meteorological Monitoring Program
Ambient Air Surveillance Program
Radiological Air Emissions
Assessment of Potential Dose to the Public
Air Quality Requirements and Compliance Strategies

Sandia National Laboratories, New Mexico (SNL/NM) conducts air quality monitoring and surveillance under three programs:

Clean Air Network (CAN) Program - conducts meteorological monitoring and ambient air surveillance.

National Emission Standards for Hazardous Air Pollutants (NESHAP) Program - coordinates with facility owners to meet radiological air emission regulations.

Air Quality Compliance (AQC) Program - ensures that all non-radiological air emission sources at SNL/NM, such as generators, boilers, chemical users, and vehicles meet applicable air quality standards and permitting requirements.



5.1 METEOROLOGICAL MONITORING PROGRAM

The main objective of the Meteorological Monitoring Program is to provide site-specific representative data for SNL/NM. The data is used for air dispersion and transport modeling, to support emergency response activities, and to support regulatory permitting and reporting processes. Additional uses of meteorological data include supporting various environmental activities and programs and providing data to SNL/NM's research and development (R&D) projects.

U.S. Department of Energy (DOE) Orders and regulations applicable to the Meteorological Monitoring Program are listed in Chapter 9.

Tower and Network Instrumentation

Sandia Corporation conducts meteorological monitoring through a network of eight meteorological towers located throughout Kirtland Air Force Base (KAFB) on or near SNL/NM property. The network includes:

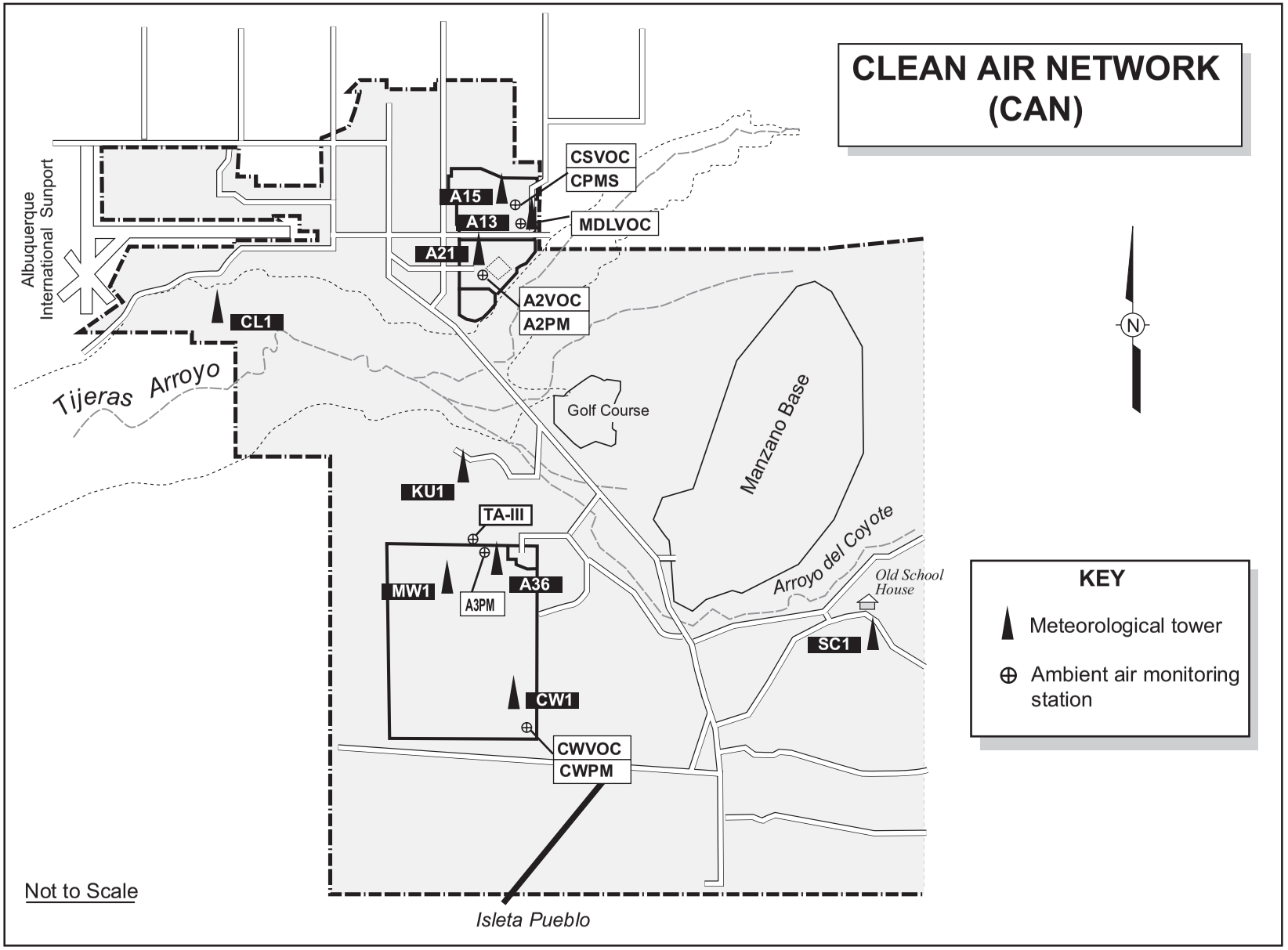
- Six 10-meter towers,
- One new 30-meter tower, and
- One 60-meter tower.

In response to laboratory changes and new building construction, the 50-meter A15 tower was decommissioned in June 2005. A 30-meter tower was constructed from the 50-meter tower, and erected approximately one-half mile from the A15 site. The new tower will meet the needs of the expanding laboratory and can be used to reflect meteorological conditions of the SNL/NM facilities just outside of the Eubank gate. Routine instrument calibrations and weekly tower site visits are performed as part of the Quality Assurance (QA) Program for the monitoring network. The CAN network of meteorological towers and ambient air monitoring locations are shown in Figure 5-1.

5.1.1 Meteorological Monitoring Results

The A36 60-meter tower is used to describe general meteorology at SNL/NM due to its central geographic position and availability of data at all instrument levels. Data taken at the A15 50-meter tower, while close to the densely populated area of SNL/NM, shows micro-scale urbanization effects and is not used to describe general meteorology. The new A13 tower takes the place of the A15 tower. Annual averages derived from the A13 and A15 towers will not be used for comparison in the 2005 Annual Site Environmental Report (ASER) due to the missing June data and the change of the environment resulting from the tower location change. All other shorter period statistics will be compared. The 2005 annual climatic summary for tower A36 is shown in Table 5-1.

In general, the annual statistics for each of the towers are similar; however, daily meteorology varies considerably across the CAN network. This real-time variability of meteorological conditions has implications on transport and dispersion of



02 _5-1.ai

FIGURE 5-1. The Clean Air Network (CAN) of Meteorological Towers and Ambient Air Monitoring Stations

TABLE 5-1. 2005 Annual Climatic Summary from Tower A36

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Temperature (°C)													
Average Daily High	9.99	9.85	12.78	19.81	25.27	30.64	33.61	30.05	28.00	19.19	14.84	9.47	20.29
Average Daily Low	-0.18	1.29	1.07	5.80	11.10	15.06	18.67	17.20	14.97	7.56	1.86	-2.70	7.64
Monthly Mean	5.13	5.45	6.95	12.70	18.55	23.50	26.31	23.38	21.38	13.64	8.83	4.07	14.16
Extremes (°C)													
High	16.34	15.00	22.26	24.74	34.28	35.01	36.34	33.68	32.13	26.77	21.88	17.64	36.34
Low	-5.52	-5.58	-7.68	-2.33	3.61	9.35	13.67	13.69	8.32	2.67	-8.87	-14.54	-14.54
Relative Humidity (percent)	59.7	64.6	51.3	35.6	34.4	23.2	29.0	43.2	40.8	58.0	32.9	35.5	42.35
Precipitation (cm)													
Monthly	4.55	4.37	2.26	2.79	0.89	0.10	3.20	2.62	3.76	2.62	0.03	0.43	27.61
24 Hour Max	1.63	1.30	0.69	1.24	0.53	0.10	2.36	1.27	1.57	1.12	0.03	0.43	2.36
Wind (m/sec)													
Monthly	3.04	3.14	4.18	4.56	4.01	3.80	4.06	3.61	3.47	3.24	3.16	2.96	3.60
24 Hour Max	7.08	6.76	7.11	7.82	6.97	6.08	7.60	7.46	6.04	8.56	6.05	5.54	8.56
Maximum Gust	19.3	19.8	23.4	22.9	24.9	27.2	25.9	20.1	21.8	24.5	20.9	18.5	27.22
Barometric Pressure (mb)	837.3	835.4	831.2	832.3	832.0	832.1	836.1	836.2	836.6	835.7	835.9	835.2	834.67

NOTES: Barometric Pressure sensor slow degradation produced approximately 0.5 mb increase in Oct-Dec values.

Conversions to English Units:
Temperature….°F = (1.8)(°C) + 32
Wind Speed…..mph = (2.2369)(m/s)
Rainfall…….in. = (2.54)(cm)
mb = millibars

°C = degree centigrade
cm = centimeter
m/sec = meters per second

pollutants, which are important in atmospheric emergency release scenarios and air dispersion modeling. Figure 5-2 shows some of the variations and extremes found in meteorological measurements across SNL/NM.

5.1.2 Wind Analysis

Annual wind roses for three locations across SNL/NM are illustrated in Figure 5-3. A wind rose is a graphical presentation of wind speed and direction frequency distribution. Wind direction is the true bearing when facing the wind (the direction from which the wind is blowing). As shown in Figure 5-3, wind directions and speeds can vary significantly across SNL/NM. Although not shown, the annual wind frequency distribution for Technical Area I (TA-I) shows yet another pattern with the greatest direction frequency from the east and east-northeast, as winds blow from Tijeras Canyon. The predominant wind direction at most locations is produced by topographic influences that also create nocturnal drainage flows.

The diurnal pattern of wind flow common through many areas at KAFB is not apparent in the annual frequency distribution. Figure 5-4 shows the day and night wind frequency distributions for tower A36, respectively. In general, the closer to the mountains or canyons, the greater the frequency of winds coming from the easterly directions at night. Daytime wind patterns are not quite as pronounced, but winds generally flow towards the mountains, and channel into the canyons, or up the Rio Grande Valley.

Wind Speed

- Average Annual Wind Speed
- Greatest Difference in Wind Speed over 24 hours
- Greatest Difference in Daily Maximum Wind Speed
- Average Difference in Daily Wind Speed

Minimum (m/sec)	Maximum (m/sec)	Spread (m/sec)
3.47 tower A21	3.76 tower CW1	0.29
7.13 tower KU1	11.34 tower A13	4.21 in Oct
15.6 tower A21	29.9 tower MW1	14.3 in July
~0.91		

Temperature

- Average Annual Temperature
- Network Annual Temperature Extremes
- Greatest Difference in Daily Minimum Temperature
- Greatest Difference in Average Daily Temperature
- Greatest Difference in Daily Maximum Temperature

Minimum (°C)	Maximum (°C)	Spread (°C)
13.91 tower SC1	14.52 tower A21	0.61
-15.80 tower KU1	37.94 tower A15	53.74
15 tower A36	22.2 tower A21	7.2 in July
12.9 tower CL1	15.1 tower SCI	2.2 in Nov
15.0 tower A13	18.1 tower MW1	3.1 in Sep

Precipitation

- Annual Precipitation (Extremes)
- Daily Rainfall Variation
- Greatest Monthly Precipitation Difference
- Greatest in Monthly Rainfall occurred in August

Minimum (cm)	Maximum (cm)	Spread (cm)
27.56 tower SC1	31.88 tower A21	4.32
0 tower SC1	2.76 tower A21	2.76 in August
2.49 tower SC1	5.49 tower A21	3.00 in August
	5.49 tower A21	

NOTES: Winter precipitation that falls as snow is underestimated (mostly at the SC1 tower)

FIGURE 5-2. Variations and Extremes in Meteorological Measurements Across the Meteorological Tower Network During 2005.

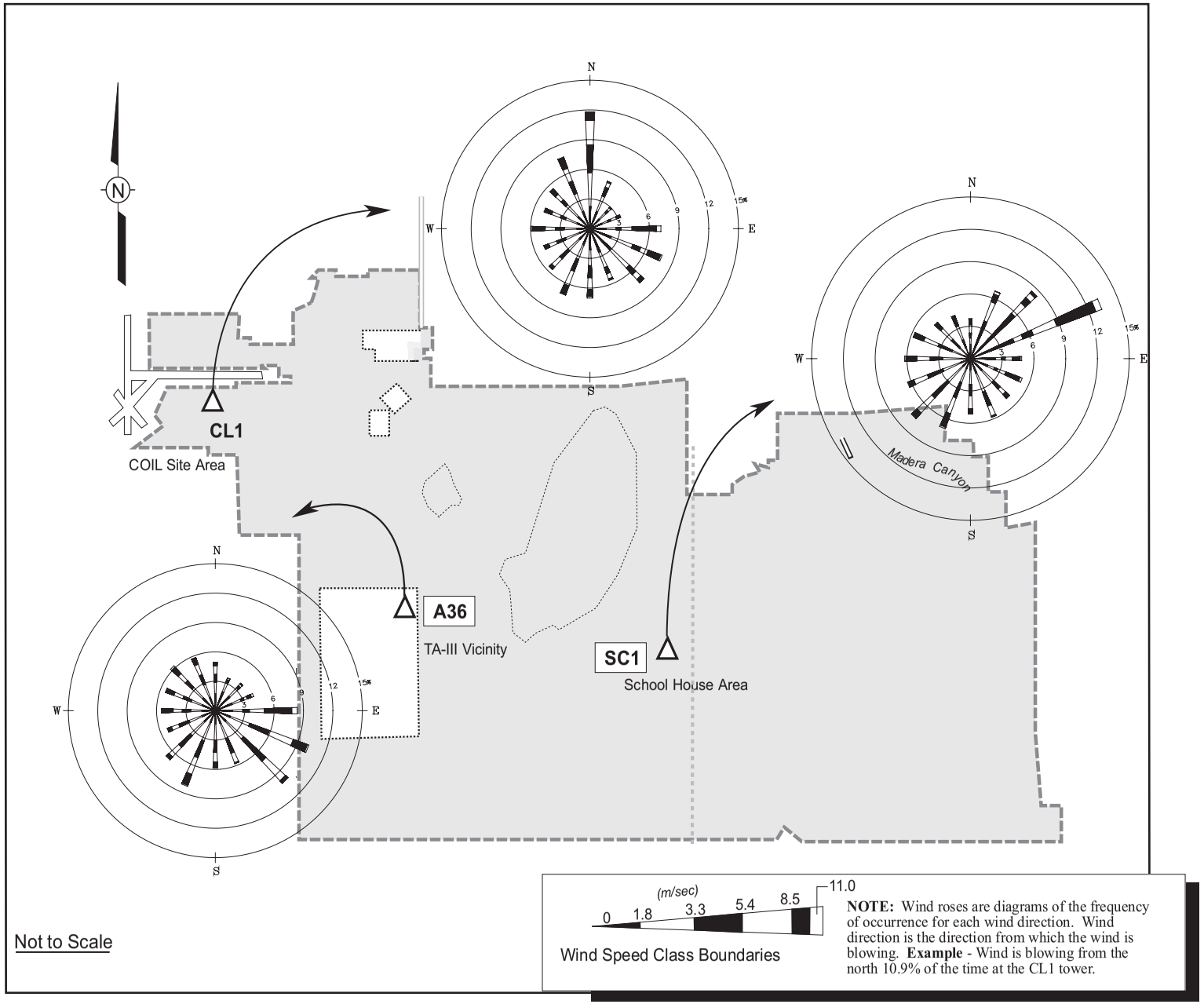


FIGURE 5-3. 2005 Annual Wind Roses for Towers CL1, A36, and SC1

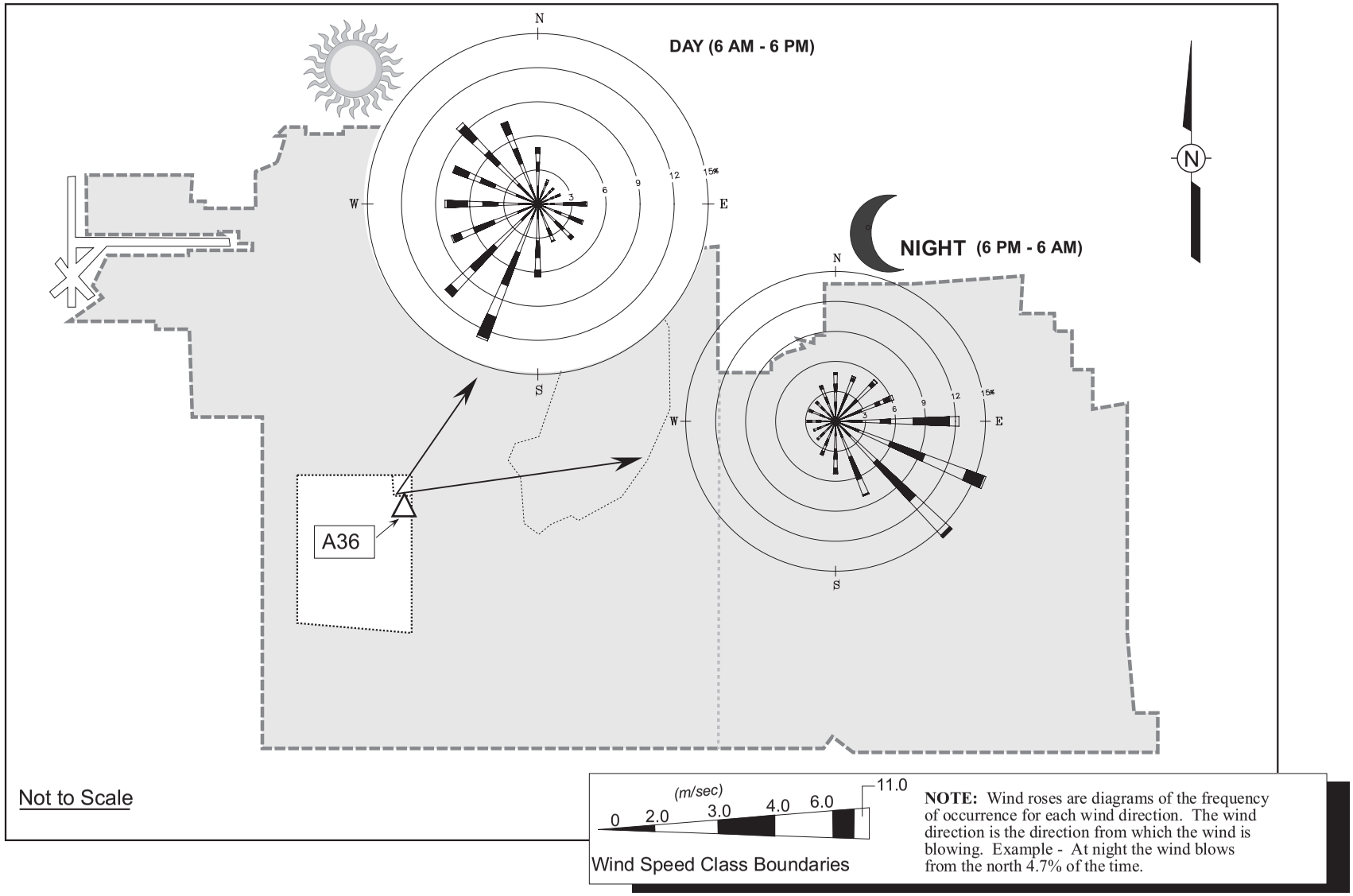


FIGURE 5-4. 2005 Annual Wind Roses for Daytime and Nighttime Wind Frequency at the A36 Tower

5.2 AMBIENT AIR SURVEILLANCE PROGRAM

Ambient air surveillance is conducted under the CAN Program through a network of air monitoring stations located throughout KAFB on or near SNL/NM property. The primary objective of the Ambient Air Surveillance Program is to show compliance with the National Ambient Air Quality Standards (NAAQS) (40 CFR 50) and New Mexico Ambient Air Quality Standards (NMAAQS) (20.2.3 NMAC). Ambient air surveillance is also important to establish background concentration levels for pollutants of concern and evaluate the effects, if any, from SNL/NM operations on the public and the environment due to operations at SNL/NM. DOE Orders and applicable regulations are listed in Chapter 9.

Ambient air surveillance is performed at six locations (illustrated in Figure 5-1).

Criteria Pollutant Monitoring Station (CPMS) – There is one CPMS in the CAN network. The CPMS is located in the NE corner of TA-I. Criteria pollutants are the set of six common pollutants for which the EPA must set national ambient standards according to the Clean Air Act (CAA). For more information on air pollutants, go to the following website:

http://www.epa.gov/ebtpages/air.html

The CPMS is used to perform continuous monitoring for sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen oxides (NO_x), and ozone (O_3). Data are then compiled into hourly averages. A particulate matter (PM) monitor is a part of the CPMS. Lead, a criteria pollutant, is one of 23 metals analyzed from PM samples at this station.

PM_{10} Stations – PM with a diameter equal to or less than 10 microns are measured at four monitoring locations (CPMS, A2PM, A3PM, and CWPM). Samples are collected over a 24-hour period starting and ending at midnight, every sixth day. This schedule is consistent with the National Air Sampling Program. Samples are analyzed for 23 metals, and are radiologically screened using gross alpha, gross beta and gamma spectroscopy.

$PM_{2.5}$ Stations – PM with a diameter equal to or less than 2.5 microns is measured at two locations (CPMS and TA-III) at SNL/NM. $PM_{2.5}$ is measured continuously, and recorded in hourly concentrations 24 hours a day, 365 days a year. Filters are not manually weighed with this system. The mass is calculated with microprocessor measurements. $PM_{2.5}$ and PM_{10} measurements at SNL/NM are done with different instruments, and should not be quantitatively compared with each other due to the differing instrument limitations and processing techniques. $PM_{2.5}$ filters are not sent to a laboratory for chemical analysis.

Volatile Organic Compound (VOC) Stations– There are four VOC monitoring stations (CSVOC, MDLVOC, CWVOC, and A2VOC). VOC samples are collected once a month over a 24-hour period.

5.2.1 Ambient Air Monitoring Results

Criteria Pollutants

In 2005, the automated data recovery for criteria pollutants was greater than 97 percent. There was a problem with the climate control system that produced system down time in June and August. Table 5-2 lists the results from the CPMS, PM_{10} and $PM_{2.5}$ monitors and compares them to NAAQS and NMAAQS for criteria pollutants.

Although violations of annual federal standards for criteria pollutants are not allowed, exceedances for short-term standards are allowable once a year. State standards also allow short-term exceedances due to meteorological conditions such as in the case of an atmospheric inversion where air mixing may be extremely restricted. There were no exceedances of the criteria pollutant standards in 2005.

PM_{10}

Data recovery for PM_{10} (with a diameter equal to or less than 10 microns) was 93 percent complete based on an every-sixth-day sampling schedule. The highest daily particulate loading occurred at the CWPM site. A PM_{10} concentration of 54 ug/m3 occurred in July 2005.

The monthly and annual averages for PM_{10} are listed in Table 5-3. The annual PM concentrations for 2005 are similar to or slightly higher than the results for 2004. A cursory comparison of the monthly averages shows that the late year PM_{10} increased as compared to 2004. Dry conditions over the area contributed

to this increase. Trending of the particulate data is not presented here due to the effects natural phenomena have on trending results, which mask SNL/NM operations' influence on particulate concentrations.

The monthly and annual averages for $PM_{2.5}$ are listed in Table 5-4. In 2005, the highest concentrations were found in the summer months and were most likely the result of wildland fire smoke transported from areas outside of SNL/NM.

All filters collected from the PM_{10} stations that have complete field data are analyzed for 23 metals, plus the radiological analyses. Filters are collected every sixth day and are consolidated into monthly composites for analyses. In 2005, monthly composites varied from three to six filters per month, depending on the sampling schedule and sampler power problems. A change in the methodology of reporting PM_{10} analytical results was established in 2002. In an attempt to provide better analytical information, results are included in averages only when they are actually higher than the radiological decision levels or instrument detection limits. Table 5-5 lists the averaged results of the PM_{10} analysis. It should be noted that the radionuclides are naturally occurring, or short lived decay daughter products

TABLE 5-2. 2005 Criteria Pollutant Results as Compared to Regulatory Standards

Criteria Pollutant	Averaging Time	Unit	NMAAQS Standard	NAAQS Standard	Maximum or Measured Concentrations
Carbon Monoxide	1 hour	ppm	13.1	35	2.73
	8 hours	ppm	8.7	9	1.65
Nitrogen Dioxide	24 hours	ppm	0.10	-	0.041
	Annual	ppm	0.05	0.053	0.013
Sulfur Dioxide§	3 hours	ppm	-	0.50	0.054
	24 hours	ppm	0.10	0.14	0.005
	Annual	ppm	0.02	0.03	<0.001
Ozone	1 hour	ppm	0.12	0.12	0.092
	8 hour	ppm		0.08	0.078[a]
PM_{10}	24 hours	µg/m³	-	150	54[b]
	Annual	µg/m³	-	50	12.1
$PM_{2.5}$	24 hours	µg/m³	-	65	19.8[c]
	Annual	µg/m³	-	15.0	8.5
Lead	30 days	µg/m³	-	-	0.0040
	Any quarter	µg/m³	1.5	1.5	0.0020

NOTES: ppm = parts per million
µg/m³ = micrograms per cubic meter
NMAAQS = New Mexico Ambient Air Quality Standards
NAAQS = National Ambient Air Quality Standards
PM_{10} = particulate matter (diameter equal to or less than 10 microns)
$PM_{2.5}$ = respirable particulate matter (diameter equal to or less than 2.5 microns)
§Standards are defined in µg/m³ and have been converted to ppm.
[a] Reported as the fourth highest average of the year – per regulatory standards.
[b] Reported as the 99th percentile value - per regulatory standards
[c] Reported as the 98th percentile value - per regulatory standards

TABLE 5-3. Monthly and Annual Averages for PM_{10} (Air)

Sample Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
A2PM	7.6	6.4	7.8	8.3	8.4	17.8	17.2	13.0	14.0	8.3	10.0	11.4	10.8
CPMS	8.4	8.4	9.4	12.4	10.0	19.6	17.4	13.0	11.7	9.0	11.0	14.4	12.1
CWPM	3.4	6.0	5.8	10.0	9.2	14.0	24.8	13.3	11.8	5.3	6.3	6.6	9.7
A3PM	3.4	3.3	5.0	9.4	7.8	13.8	14.0	11.0	11.4	7.2	6.5	8.6	8.5

TABLE 5-4. Monthly and Annual Averages for $PM_{2.5}$ (Air)

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
CPMS	6.46	6.33	6.15	8.50	8.62	11.68	12.69	8.76	9.10	8.39	8.38	7.03	8.51
TA-III	5.30	5.26	5.40	7.88	7.47	9.31	9.94	7.81	8.06	7.00	7.14	5.89	7.20

TABLE 5-5. Averaged Results of PM_{10} Analysis (Air)

Analyte	Units	A2PM	CPMS	CWPM	A3PM	TLV
Aluminum	ug/m3	0.1461	0.167	0.139	0.123	2000
Antimony	ug/m3	0.0003	0.0005	0.0001	0.0001	500
Arsenic	ug/m3	0.0004	0.0005	0.0001	0.0001	10
Barium	ug/m3	0.0176	0.0089	0.0074	0.0126	50
Beryllium	ug/m3	ND	0.0004	ND	ND	2
Cadmium	ug/m3	0.0000	0.0001	ND	0.0000	10
Calcium	ug/m3	0.5279	0.6768	0.3737	0.2704	2000
Chromium	ug/m3	0.0003	0.0006	0.0002	0.0002	10
Cobalt	ug/m3	0.0001	0.0001	0.0000	0.0000	20
Copper	ug/m3	0.0076	0.0092	0.0068	0.0039	1000
Iron	ug/m3	0.1160	0.1656	0.1034	0.0807	5000
Lead	ug/m3	0.0009	0.0013	0.0007	0.0006	150
Magnesium	ug/m3	0.1054	0.1243	0.0824	0.0657	10000
Manganese	ug/m3	0.0029	0.0040	0.0026	0.0019	200
Nickel	ug/m3	0.0002	0.0003	0.0002	0.0002	50
Potassium	ug/m3	0.1577	0.2022	0.1140	0.1038	2000
Silver	ug/m3	0.0002	0.0002	0.0001	0.0001	10
Sodium	ug/m3	2.6018	2.0300	1.8237	2.2746	5000
Thallium	ug/m3	0.0001	0.0001		0.0000	100
Vanadium	ug/m3	0.0004	0.0005	0.0004	0.0004	50
Zinc	ug/m3	0.0087	0.0081	0.0049	0.0058	10
Uranium	ug/m3	0.00001	0.00001	0.00001	0.0000	200
Gross Alpha	pCi/m3	0.0062	0.0061	0.0056	0.0047	
Gross Beta	pCi/m3	0.0181	0.0204	0.0182	0.0197	
Actinium-228	pCi/m3	0.0052	0.0061		0.0036	100
Beryllium-7	pCi/m3	0.1467	0.1401	0.1531	0.1367	40000
Bismuth-214	pCi/m3	ND	0.0017	0.0024	0.0024	2000
Chromium-51	pCi/m3	ND	0.0200	ND	ND	50000
Cobalt-60	pCi/m3	ND	0.0001	ND	0.0012	80
Lead-212	pCi/m3	0.0021	0.0023	0.0025	ND	80
Lead-214	pCi/m3	0.0019	ND	0.0021	0.0051	2000
Niobium-95	pCi/m3	ND	0.0020	ND	0.0009	3000
Potassium-40	pCi/m3	0.0061	0.0083	0.0037	0.0269	900
Radium-224	pCi/m3	0.0195	0.0103	0.0344	0.0261	4
Radium-226	pCi/m3	ND	0.0017	0.0024	0.0024	1
Radium-228	pCi/m3	0.0052	0.0061	ND	0.0036	3
Strontium-85	pCi/m3	ND	ND	0.0003	0.0015	4000
Thallium-208	pCi/m3	0.0010	0.0007	0.0015	0.0009	
Thorium-232	pCi/m3	0.0021	0.0022	0.0036	ND	0.01
Thorium-234	pCi/m3	0.1906	0.0102	0.0327	0.0807	400
Uranium-235	pCi/m3	0.0119	ND	ND	0.0058	0.1
Uranium-238	pCi/m3	0.1906	0.0102	0.0327	0.0807	0.1

NOTES: $\mu g/m^3$ = micrograms per cubic meter
pCi/m^3 = picocuries per cubic meter
TLV= threshold limit value (TLVs are guidelines and not legal standards.
TLV guidelines assist in the control of health hazards) (ACGIH 2006).
The TLVs listed for the radionuclides are derived from DOE Order 5400.5 dose concentration guidelines defined for 100 m/rem.
ND = not detected

found while the sample was in the counter, and are not emitted from sources at the SNL/NM.

An Analysis of Variance (ANOVA) was performed to determine if statistical differences existed between stations. The results of the ANOVA indicated that there were no statistically significant differences between the sites. Most of the radionuclide averages in Table 5-5 are based on the results of one or two samples in the year identifying small concentrations of the analyte. The concentration of Uranium-238 at the A2PM site appears to exceed the DOE derived concentrations guideline (DCG) identified in the threshold limit values (TLV) column. This result is an artifact of the averaging method used to try to provide more representative data. The DCG is based on a continuous exposure for a whole year, and is a time weighted annual averaged. The average reported at the A2PM site is based on four samples, as the rest of the samples showing that U-238 was not detected are not included in the average. The four samples out of the year do not represent a continuous exposure, and the average identified is not a true annual average. The annual DCG was not exceeded at A2PM.

$PM_{2.5}$

This is the second year that $PM_{2.5}$ is reported in the ASER. $PM_{2.5}$ is also known as "fine particulate." Fine particulates are thought to be a greater health hazard than PM_{10} because the smaller sized particles can lodge deep in the lungs. Most $PM_{2.5}$ is created either directly from combustion of all types of fossil fuels, including wood burning, or by secondary reactions of gases created in the combustion process with other gases in the atmosphere. The data recovery for $PM_{2.5}$ measurements was approximately 98 percent.

VOCs

The VOCs generally observed at SNL/NM are products or by-products of fossil fuels or are from lab operations. In 2005, the data recovery for VOC monitoring was 98 percent. Monthly VOC samples were analyzed for 26 VOC species plus total non-methane hydrocarbon (TNMHC). Table 5-6 shows the compiled results for compounds detected.

The concentrations in Table 5-6 show that there is no one site that has the highest concentration for all analytes, though the greatest number of contaminants are found at the CSVOC site. The 1,1,1–Trichloroethane at the MDLVOC was driven by warm season concentrations. An ANOVA was performed to determine if statistical differences existed between locations for each VOC. The ANOVA revealed that there were no statistically valid differences. The 1,1,1-TCA at the MDLVOC did not pass the statistical difference test.

5.3 RADIOLOGICAL AIR EMISSIONS

The U.S. Environmental Protection Agency (EPA) regulates radionuclide air emissions in accordance with 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities." The EPA has set a maximally exposed individual (MEI) radiological dose limit of 10 millirems per year (mrem/yr) resulting from all radiological air emissions produced from a DOE facility.

5.3.1 Compliance Reporting

Sandia Corporation prepares an annual NESHAP report that summarizes radionuclide air emission releases from SNL/NM facilities and presents the results of the annual dose assessment. The DOE, National Nuclear Security Administration (NNSA), Sandia Site Office (SSO) submits the annual report to EPA and the City of Albuquerque's Environmental Health Division. The NESHAP report is complemented by a more comprehensive report detailing facility emission factors, demographic data, and dose assessment calculations and is available to the EPA, the DOE, and the City of Albuquerque upon request. The NESHAP reports prepared in 2005 include the *NESHAP Annual Report for CY05, Sandia National Laboratories, New Mexico* (SNL 2006a).

5.3.2 SNL/NM NESHAP Facilities

SNL/NM currently has 16 potential NESHAP facilities that may be defined as either point or diffuse emissions sources. Point sources are produced from an exhaust stack or vent, while diffuse sources emanate from broad areas of contamination, such as radionuclide-contaminated soils present at some Environmental Restoration (ER) sites.

One new facility was added this year, the Radiation Protection Sample Diagnostic Laboratory (RPSD). This facility is just south of Hardin and east of Wyoming.

TABLE 5-6. VOC Average Concentrations Compiled from Monthly Results at Four Stations (Air)

Average was computed using only detected results.

Compound	CSVOC	CW 1	MDLVOC	TA-II	TLV
1,1,1-Trichloroethane **	2.57	7.35	22.66	0.74	350000
1,1,2-Trichlorotrifluoroethane **	0.06	ND	ND	ND	1000000
1,4-Dioxane	ND	ND	2.91	ND	20000
1-Butene/Isobutene	1.26	0.57	1.16	0.81	NA
2,2,4-Trimethylpentane	0.24	ND	0.08	ND	NA
2-Butanone (MEK)	1.27	0.87	1.49	1.21	200000
2-Methylbutane	4.85	1.57	2.28	1.29	1770000
3-Methylpentane	0.27	ND	0.18	0.34	500000
4-Methyl-2-pentanone (MIBK)	0.31	ND	ND	ND	50000
Acetone	7.01	7.62	9.51	7.16	500000
Benzene	0.34	0.08	0.18	0.17	500
Carbon tetrachloride **	0.14	0.14	0.19	0.18	5000
Chloromethane	0.56	0.55	0.57	0.51	50000
Dichlorodifluoromethane **	0.56	0.54	0.54	0.55	1000000
Ethylbenzene	0.17	ND	ND	ND	100000
Isohexane	0.39	ND	0.15	0.34	100000
Methylene chloride	0.58	0.70	0.66	1.78	50000
n-Butane	0.80	0.27	0.63	0.47	800000
n-Hexane	0.36	ND	0.19	0.16	50000
n-Pentane	1.69	0.63	1.00	0.87	600000
o-Xylene	0.19	ND	ND	0.10	100000
p-Xylene/m-Xylene	0.43	ND	0.16	0.20	100000
Tetrachloroethene	0.34	ND	ND	ND	25000
Toluene	2.41	0.72	0.70	0.55	50000
Trichloroethene	0.39	ND	ND	ND	50000
Trichlorofluoromethane **	0.32	0.29	0.31	0.28	1000000
TNMHC	25.33	17.35	28.50	16.75	NA

NOTES: ppbv = parts per billion by volume
ND = not detected
NA = not available
VOC = volatile organic compounds. VOCs may be shown as separate species as well as in combination with another analyte.
TLV= threshold limit value (TLVs are guidelines and not legal standards. TLV guidelines assist in the control of health hazards) (ACGIH 2006)
** Ozone depleting compounds

TABLE 5-7. Summary of Radionuclide Releases from the 16 NESHAP Sources in 2005

TA	Facility Name	Monitoring Method *	Used in Dose Calculation?	Radionuclide	Reported Release (Ci/yr)
I	Sandia Tomography and Radionuclide Transport (START) Laboratory	Calculation	No	^{60}Co ^{137}Cs ^{239}Pu	3.4E-07 5.5E-07 1.0E-07
I	Radiation Laboratory	Calculation	No	^{3}H ^{13}N ^{41}Ar	1.0E-05 2.0E-07 1.0E-09
I	Calibration Laboratory	Calculation	No	^{3}H	2.2E-05
I	Neutron Generator (NGF)	Continuous	Yes	^{3}H	0.56
I	TANDEM Accelerator	Calculation	No	^{3}H	1.0E-05
I	Metal Tritide Shelf-Life Laboratory	Calculation	No	^{3}H	5.0E-09
I	Cleaning and Contamination Control Laboratory (CCCL)	Calculation	No	N/A	N/A
I	Radiation Protection Sample Diagnostics Laboratory (RPSD)	Calculation	No	^{243}Am ^{36}Cl ^{244}Cm ^{57}Co ^{60}Co ^{134}Cs ^{137}Cs ^{55}Fe ^{3}H ^{54}Mn ^{63}Ni ^{236}Pu ^{238}Pu ^{239}Pu ^{241}Pu ^{242}Pu ^{226}Ra ^{228}Ra ^{90}Sr ^{99}Tc ^{232}Th ^{232}U ^{233}U ^{236}U ^{238}U ^{65}Zn	3.9E-13 1.2E-08 1.3E-10 1.0E-10 1.0E-10 1.2E-08 1.2E-08 1.3E-10 1.2E-08 1.3E-10 1.3E-10 3.9E-13 3.9E-13 3.9E-13 3.9E-13 3.9E-13 1.3E-10 1.3E-10 1.3E-10 1.2E-08 1.3E-10 3.9E-13 3.9E-13 1.3E-10 1.3E-10 1.0E-15
II	Explosive Components Facility (ECF)	Calculation	No	^{3}H	8.0E-04
III	Mixed Waste Landfill (MWL)	Periodic	Yes	^{3}H	0.09
III	Radioactive & Mixed Waste Management Facility (RMWMF)	Continuous	Yes	^{3}H ^{241}Am ^{90}Sr ^{137}Cs	10 HTO, 0.74 elemental 2.2E-05 3.5E-07 1.4E-07
IV	High Energy Radiation Megavolt Electron Source III (HERMES III)	Periodic	No	^{13}N ^{15}O	1.4E-03 1.4E-04
IV	Z-Facility (Accelerator)	Calculation	No	^{3}H	6.6E-03
V	Hot Cell Facility (HCF)	Periodic	Yes	N/A	N/A
V	Annular Core Research Reactor (ACRR)	Periodic	Yes	^{41}Ar	4.86
V	Sandia Pulsed Reactor (SPR)	Periodic	Yes	^{41}Ar	7.0E-03

NOTES: *Monitoring Method: Periodic = Based on periodic measurements
Continuous = Based on continuous air monitoring results
TA= Technical Area
Calculation = Calculated from known parameters
Ci/yr = curies per year
N/A = not available

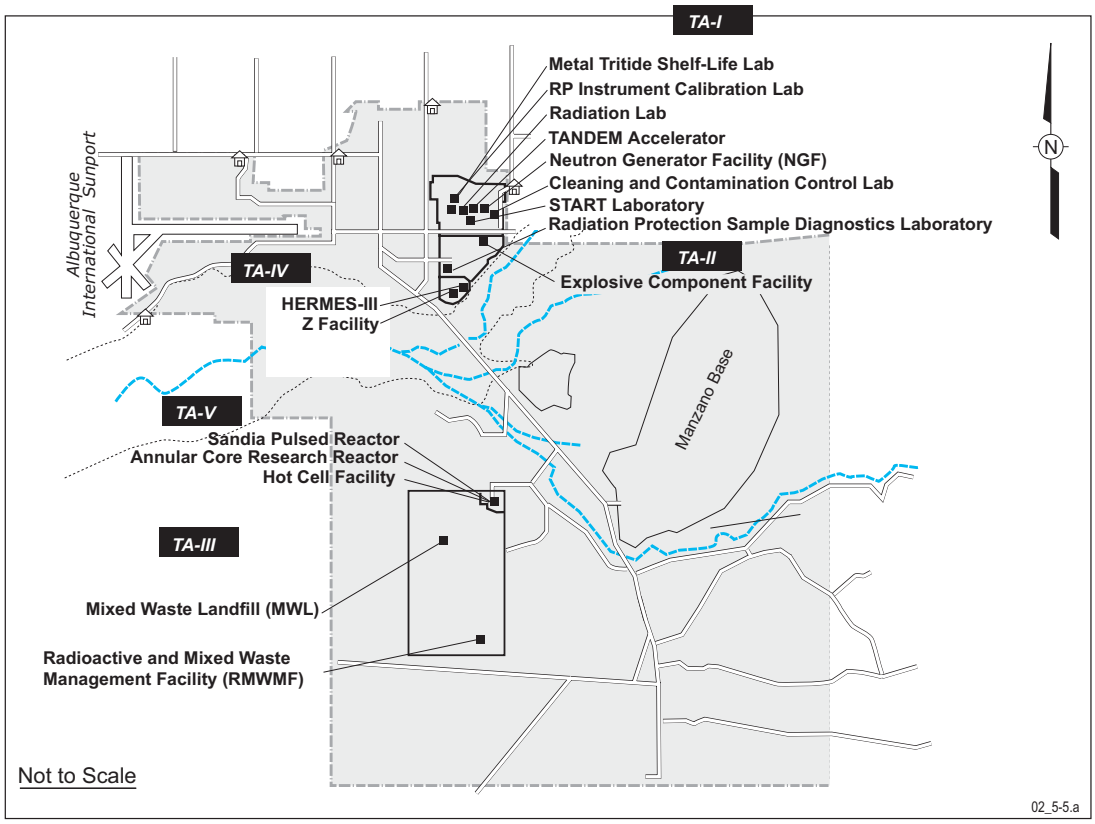


FIGURE 5-5. Locations of the 16 Facilities at SNL/NM that Provided Radionuclide Release Inventories in 2005

Table 5-7 lists the radionuclides and the total reported emissions (in curies) from each SNL/NM NESHAP source in 2005. Of the 16 sources, 15 were point sources and one was a diffuse source (landfill). Two of the 16 facilities reported no emissions in 2005.

The 16 SNL/NM NESHAP facilities are illustrated in Figure 5-5 and are described below.

TA-I Sources

Calibration Laboratory – Calibration on radiation detection equipment resulted in small releases of tritium.

Cleaning and Contamination Control Laboratory (CCCL) – The CCCL is used for R&D of new and superior materials for government and industrial needs. No emissions were reported in 2005.

Metal Tritide Shelf-Life Laboratory – This laboratory, which conducts research on tritium materials, released negligible levels of tritium (five billionths of a curie).

Neutron Generator Facility (NGF) – The NGF is the nation's principal production facility for neutron generators. This facility currently emits only tritium. The facility has two stacks, but only utilizes the main stack in the Tritium Envelope North Wing. In 2005, 0.56 Curies (Ci) were reported released from the North Wing stack, based on continuous stack monitoring. Although anticipated tritium releases do not exceed the regulatory threshold requiring continuous monitoring, it is performed voluntarily at the NGF as a best management practice (BMP). Emissions from NGF are expected to increase over the next few years due to an increase in their production.

Radiation Laboratory – Small-scale radiation experiments resulted in the release of air-activation products and tritium.

Radiation Protection Sample Diagnostics Laboratory (RPSD) – Small-scale radiometric sample analyses on an as-needed basis.

Sandia Tomography and Radionuclide Transport (START) Laboratory – This laboratory is used to perform small-scale experiments. In 2005, the facility reported emissions of plutonium-239, cobalt-60 and cesium-137.

TANDEM Accelerator – This is an ion solid interaction and defect physics accelerator facility. Although the TANDEM did not operate in 2005, the facility reported potential emissions of tritium that were being housed in the facility.

TA-II Sources

Explosive Components Facility (ECF) – The ECF conducts destructive testing on neutron generators. In 2005, the facility reported emissions of tritium.

TA-III Sources

Mixed Waste Landfill (MWL) – The MWL was closed in 1988. Although a diverse inventory of radionuclides is present in the MWL, measurements indicate that tritium is the only radionuclide released into the air. In 1992, 1993, and 2003, three special studies were conducted to quantify the tritium emissions (Anderson 2004). The most recent value, from 2003, is used for their annual inventory.

Radioactive and Mixed Waste Management Facility (RMWMF) – The RMWMF primarily handles low-level waste (LLW), mixed waste (MW), and some transuranic (TRU) waste. In 2005, the RMWMF reported tritium releases, americium-241, strontium-90, and cesium-137 as determined by continuous stack monitoring. Although anticipated tritium releases do not exceed the regulatory threshold requiring continuous monitoring, it is performed voluntarily at the RMWMF as a BMP.

TA-IV Sources

High-Energy Radiation Megavolt Electron Source - III (HERMES - III) – The HERMES-III accelerator is used to test the effects of prompt radiation on electronics and complete military systems. This facility produces air activation products, primarily nitrogen-13 and oxygen-15. In 2005, the facility reported releases of nitrogen-13 and oxygen-15.

Z Facility – The Z Facility is an accelerator used for research on light ion inertial confinement fusion. Large amounts of electrical energy are stored over several minutes and then released as an intense concentrated burst (shot) at a target. In 2005, the facility reported releases of tritium.

TA-V Sources

Annular Core Research Reactor (ACRR) – This reactor is used primarily to support defense program projects. If required in the future, the facility also has the capability to support the Medical Isotope Production Project (MIPP). Argon-41, an air activation product, was the only reported release in 2005.

Hot Cell Facility (HCF) – The HCF provides full capability to remotely handle and analyze radioactive materials such as irradiated targets. In 2005, there were no reportable emissions. The lead characterization program work is done where there is triple HEPA filtration, so again there were no reportable emissions.

Sandia Pulsed Reactor (SPR) – The SPR is used to produce intense neutron bursts for effects testing on materials and electronics. In 2005, release of Ar-41 was reported.

5.4 ASSESSMENT OF POTENTIAL DOSE TO THE PUBLIC

In general, the dose received by a person is dependent on the distance from the source, the available pathways in the environment (food chain, air, and water), radionuclide quantities and properties, and meteorological conditions. Historically, radioactive releases from SNL/NM have resulted in doses to the public that are several orders of magnitude below the EPA's standard of 10 mrem/yr. Radiation protection standards specific to DOE facilities are given in Chapter 9.

5.4.1 NESHAP Dose Assessment Input

Emission Sources

To assess compliance, all NESHAP facilities at SNL/NM must submit annual facility emission data to the NESHAP Program administrator. The emissions from seven "primary" sources (ACRR, SPR, HCF, Z Facility, NGF, RMWMF, and MWL) are modeled using EPA's CAA Assessment Package-1988 (CAP88) (EPA 2005) to estimate the annual dose to each of 35 identified public receptors. Primary sources are those that determine their emissions by direct measurements or by calculations based on measured operational parameters. The HCF was the only primary source to report no emissions in 2005.

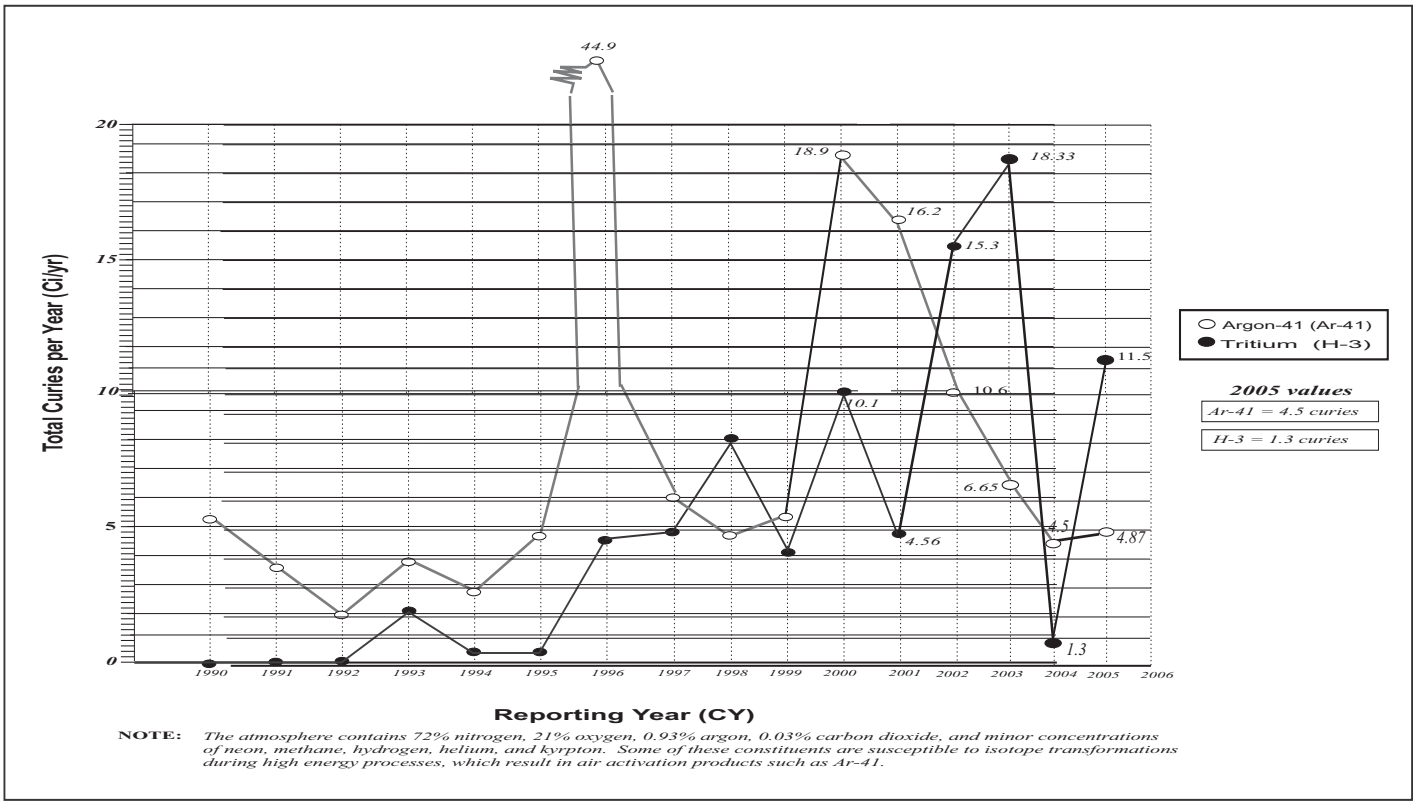


FIGURE 5-6. Summary of Atmospheric Releases in Argon-41 and Tritium from SNL/NM Facilities Since 1990 (Emissions vary from year to year based on operations within the facility)

The NESHAP regulation requires DOE to continuously monitor any radionuclide air emission source that has the potential to produce a dose of 0.1 mrem/yr to the MEI; however, there are no facilities at SNL/NM that exceed this criterion. As a BMP, some SNL/NM facilities perform continuous stack monitoring. Other facilities base their emission estimates on periodic confirmatory measurements or engineering calculations. In 2005, the highest emissions were argon-41 and tritium. The increase in the tritium release again in 2005 was due to the final processing of tritium-containing oil waste at the RMWMF (begun in 2003). Historically, these radionuclides have been the most significant contributors to the effective dose equivalent (EDE) of the MEI. Figure 5-6 shows the annual reported release in curies of argon-41 and tritium over the past 15 years.

Demographic Data

Demographic data includes resident population, the number of beef and dairy cattle, and the utilized food crop area fraction for the 50-mi radius study area. The densities for resident population, cattle, and food crops are calculated as the quotient of the most recent county data and the county land area (e.g., cows per acre). In 2005, the NESHAP calculation for resident population was based on the State's 2000 to 2001 estimated urban and county population data and U.S. Census Bureau data (DOC 2006). The beef and dairy cattle numbers and food crop area fraction were calculated using 1998 agricultural statistics. The statistics were supplied by the New Mexico Department of Agriculture (NMDOA 2006). The following values were used in the 2005 CAP88 calculation:

1.927	Dairy cattle/km^2
1.156	Beef cattle/km^2
8.1E-04	Acres of food crops/m^2
793,740	Population (within 50-mi radius)

On-site and Off-site Public Receptors

A total of 30 receptor locations (19 on-site at KAFB and 11 off-site) in the vicinity of SNL/NM have been identified as potential locations of maximum exposure to a member of the public. Off-site receptor locations extend to the Isleta Pueblo, the Four Hills subdivision north of KAFB, the Manzanita Mountains (east mountain residents), and areas near the Albuquerque International Sunport west of KAFB. On-site receptors include U.S. Air Force (USAF) facilities, offices and housing areas, as well as other non-DOE and non-U.S. Department of Defense (DoD) facilities on KAFB.

TABLE 5-8. Annual Source-Specific Effective Dose Equivalent (EDE) to Off-site Receptors in 2005

Receptor	ACRR	MWL	NGF	SPR	RMWMF	Z Facility	EDE (mrem/yr)
Albuquerque City Offices	1.70E-05	7.70E-07	1.20E-05	2.60E-08	8.30E-07	1.70E-07	3.08E-05
East Resident	9.10E-06	7.60E-07	1.20E-05	1.50E-08	3.00E-07	1.20E-07	2.23E-05
Eubank Gate Area	8.30E-05	8.30E-07	1.20E-05	1.30E-07	1.80E-06	4.20E-06	1.02E-04
Four Hills Resident	9.00E-06	7.60E-07	1.20E-05	2.60E-08	2.70E-07	1.10E-07	2.21E-05
Isleta	1.20E-05	7.70E-07	1.20E-05	2.40E-08	1.00E-06	1.80E-07	2.60E-05
La Luz Childcare	4.70E-05	7.90E-07	1.30E-05	7.50E-08	1.00E-06	5.50E-07	6.23E-05
Manzano Mesa Apartments	1.90E-05	7.70E-07	1.20E-05	3.00E-08	5.30E-07	2.50E-07	3.26E-05
Tijeras Arroyo (West)	1.70E-05	7.70E-07	1.20E-05	2.70E-08	8.30E-07	1.70E-07	3.08E-05
U.S. Geological Survey	2.60E-05	7.90E-07	1.20E-05	5.90E-08	1.50E-06	2.40E-07	4.05E-05
Veteran's Hospital	2.40E-05	8.00E-07	1.20E-05	5.20E-08	1.40E-06	3.30E-07	3.85E-05
Willow Wood Housing	2.10E-06	8.00E-07	1.20E-05	3.30E-08	6.10E-07	2.30E-07	1.57E-05

NOTES: mrem/yr = millirem per year
ACRR = Annular Core Research Reactor
SPR = Sandia Pulsed Reactor
MWL = Mixed Waste Landfill
RMWMF = Radioactive Mixed Waste Management Facility
NGF = Neutron Generator Facility

TABLE 5-9. Annual Source-Specific Effective Dose Equivalent (EDE) to On-site Receptors in 2005

Receptor	ACRR	MWL	NGF	SPR	RMWMF	Z Facility	EDE (mrem/yr)
Airport	2.00E-04	1.70E-08	3.70E-10	5.40E-10	2.70E-06	5.50E-09	2.15E-04
ANG Communications Flight	9.30E-05	1.40E-08	3.70E-10	6.60E-10	2.30E-06	4.10E-09	1.50E-04
Bernalillo County Sheriff Training	1.40E-04	1.70E-08	1.30E-10	4.70E-10	4.70E-06	1.00E-09	2.62E-04
Chestnut Site	1.50E-04	3.60E-08	3.50E-08	3.50E-11	2.90E-05	6.50E-10	1.04E-03
Golf Course Club House	3.40E-04	3.60E-08	9.60E-08	2.30E-10	4.10E-06	3.30E-09	5.25E-04
Golf Course Maintenance Area	2.20E-04	2.70E-08	1.30E-07	2.40E-10	3.40E-06	5.50E-09	3.77E-04
Honeywell Systems/Support Site	9.40E-05	1.20E-08	1.80E-06	1.40E-09	2.00E-06	1.30E-08	1.73E-04
LRRI/Lovelace	4.70E-05	1.00E-08	2.20E-08	2.80E-09	3.30E-06	3.80E-10	1.26E-04
KAFB Fire Station	9.40E-05	1.00E-08	6.70E-07	4.40E-09	1.80E-06	6.00E-09	1.45E-04
KAFB Landfill	4.70E-05	6.50E-09	3.70E-08	4.40E-09	1.60E-06	7.50E-10	8.10E-05
Kirtland Storage Site	8.20E-04	6.50E-08	1.00E-07	6.50E-10	4.90E-06	4.80E-09	9.56E-04
Manzano Fire Station	1.20E-04	1.80E-08	5.40E-08	4.60E-10	3.90E-06	9.90E-10	2.82E-04
Pershing Park Housing	7.00E-05	8.60E-09	3.50E-07	5.40E-10	1.60E-06	2.50E-09	1.14E-04
Riding Club	7.70E-05	8.20E-09	2.90E-07	6.30E-10	1.50E-06	3.30E-09	5.32E-04
Sandia Area Federal/Credit Union	3.20E-04	3.40E-08	6.70E-08	2.00E-11	5.20E-06	1.50E-09	1.73E-04
Sandia Elementary School	1.10E-05	1.20E-08	1.10E-06	6.60E-10	1.90E-06	9.40E-09	1.10E-04
Shandiin Childcare	6.90E-05	8.70E-09	4.20E-07	1.30E-09	1.60E-06	4.00E-09	1.62E-04
Vehicle Maintenance Flight	1.00E-04	1.10E-08	5.50E-07	6.60E-10	1.90E-06	7.00E-09	1.47E-04

NOTES: ACRR = Annular Core Research Reactor
MWL = Mixed Waste Landfill
SPR = Sandia Pulsed Reactor
NGF = Neutron Generator Facility
RMWMF = Radioactive Mixed Waste Management Facility
LLRI = Lovelace Respiratory Research Institute
mrem/yr = millirem per year
KAFB = Kirtland Air Force Base
ANG = Air National Guard
* Zia Park Housing, listed in previous years, was vacant in 2005, undergoing demolition

TABLE 5-10. Calculated Dose Assessment Results for On-site and Off-site Receptors and for Collective Populations in 2005

Dose to Receptor	Location	2005 Calculated Dose	NESHAP Standard
Individual Dose			
On-site Receptor EDE to the MEI	KAFB Storage Facility	8.2E-4 mrem/yr *(8.2E-6 mSv/yr)*	10 mrem/yr *(0.1 mSv/yr)*
Off-site Receptor EDE to the MEI	Eubank Gate Area	0.0001 mrem/yr *(0.00001 mSv/yr)*	10 mrem/yr *(0.1 mSv/yr)*
Collective Dose			
Collective Regional Population[1]	Residents within an 80-km (50-mi) radius	1.7E-4 person-rem/yr *(1.7E-6 person-Sv/yr)*	No standard available
Collective KAFB Population[2]	KAFB housing	8.6E-4 person rem/year *(8.6E-6 person-Sv/yr)*	No standard available

NOTES: [1]Based on a population of 793,740 people estimated to be living within an 80-km (50-mi) radius.
[2]Based on a population of 953 people estimated to be living in permanent on-base housing.
mSv/yr = millisievert per year
person-Sv/yr = person-sievert per year
mrem/yr = millirem per year
EDE = effective dose equivalent
MEI = maximally exposed individual
KAFB = Kirtland Air Force Base
NESHAP = National Emissions Standards for Hazardous Air Pollutants

Meteorology

Data from four meteorological towers (CW1, A36, A21, and MW1) in the proximity of NESHAP emission sources were used in 2005. Data from each tower consisted of approximately 35,000 hourly observations of wind direction, wind speed, and stability class (inferred from wind and solar insulation data). The data are compiled into a normalized distribution from which all wind and stability frequency-of-occurrence data were derived.

5.4.2 Dose Assessment Results

CAP88 utilizes a Gaussian plume equation that estimates air dispersion in both the horizontal and vertical directions. Individual EDEs to off-site and on-site receptors are presented in Tables 5-8 and 5-9, respectively. Dose assessment results are summarized in Table 5-10.

The total dose at each receptor location is determined by summing the individual doses resulting from each source. The dose to the MEI member of the public is then compared to the EPA limit of 10 mrem/yr.

In 2005, the on-site MEI was located on KAFB, at the KAFB Storage Facility NW of TA-V. The on-site MEI was located at the Chestnut Site in 2004 due to increased activities at the RMWMF during 2004. The MEI dose of 8.2E-4 mrem/yr at the KAFB Storage Facility resulted primarily from releases of argon-41 from the ACRR in nearby TA-V. The off-site MEI was located at the Eubank Gate Area. The MEI was 0.0001 mrem/yr.

By comparison, the average person in the Albuquerque area receives 330 to 530 mrem/yr resulting primarily from radon emanating from earth materials, medical procedures, consumer products, and cosmic radiation (Brookins 1992).

Collective Dose

The collective population dose resulting from all SNL/NM radiological emissions was calculated for both KAFB and the regional area (Table 5-10). Collective dose calculations are not required by NESHAP regulations; however, it provides a useful numerical comparison of the public dose from year to year. Collective dose is calculated by multiplying a representative individual dose, within a population, by the total population. SNL/NM calculates the collective population dose for both the KAFB housing areas and the general Albuquerque area population within an 80-km (50-mi) radius.

• **Regional** – The Albuquerque regional collective population dose in 2005 was .00017 person-rem/yr. This is significantly less than reported in 2004. This is largely due to a change from Version 2 to Version 3 of CAP88PC. The newer version uses improved modeling methodology. For the purpose

of calculating the collective dose, all releases are assumed to occur from a location centered in TA-V. The population dose was calculated by multiplying 793,740 residents by doses per sector.

• **KAFB** – A collective population dose for KAFB residents was calculated based on six main housing areas. The total population dose for KAFB was obtained by summing the six areas based on a total residential population of 953. This resulted in an estimated population dose of .00024 person-rem/yr.

5.5 AIR QUALITY REQUIREMENTS AND COMPLIANCE STRATEGIES

Air quality standards are implemented by regulations promulgated by local and federal governments in accordance with the CAA and the CAA amendments (CAAA) of 1990. The Albuquerque/Bernalillo County Air Quality Control Board (ABC/AQCB), the State of New Mexico, and the EPA determine applicable air quality standards for non-radiological pollutants. Radionuclide air emissions are currently regulated by the EPA under NESHAP, as discussed in Section 5.4. A complete list of air quality regulations applicable to SNL/NM is given in Chapter 9.

5.5.1 SNL/NM Air Emission Sources

As discussed in Section 5.2, criteria pollutants include SO_2, NO_2, CO, O_3, PM, and lead (Pb). For these criteria and other pollutants, the EPA:

- Sets ambient air quality standards, including those for motor vehicle emissions;
- Requires state implementation plans for protection and improvement of air quality;
- Institutes air quality programs to prevent the nation's air from deteriorating; and
- Establishes hazardous air pollutant (HAP) control programs.

EPA standards for criteria pollutants are given in 40 CFR 50, "National Ambient Air Quality Standards" and implemented in 20.11.08NMAC "Ambient Air Quality Standards." Compliance with criteria pollutant standards for ambient air is met through ambient air surveillance, periodic direct emission sampling, and fuel throughput tracking and reporting. As discussed in the previous section, ambient air measurements taken in the vicinity of SNL/NM facilities have been well below maximum TLVs and standards for criteria pollutants.

The significant sources of criteria pollutants at SNL/NM are listed below.

Steam Plant

The Steam Plant produces steam heat for buildings in TA-I. The plant has run continuously since 1949. The five boilers (Boilers 1, 2, 3, 5, and 6) run primarily on natural gas, but can also burn diesel. All five boilers were used in 2005. The volume of fuel throughput used in the boilers is reported to the City of Albuquerque. In 2005, fuel throughput reported at the Steam Plant was as follows:

Natural Gas (scf)	Diesel (gal)
440,382,711	123,273

NOTE: scf = standard cubic feet gal = gallon

As defined by 20.11.67 NMAC, "Equipment, Emissions, Limitations," the Steam Plant Boilers 1, 2, and 3 fall below the applicable minimum emission limits for NOx; however, Boilers 5 and 6 cannot allow NOx emissions to the atmosphere in excess of 0.3 pounds per million British thermal units (BTU) of heat input. Stack sampling is required for the Steam Plant since Permit No.1705 was issued November 10, 2004. Stack sampling was performed on March 16 and 17, 2005, but a Notice of Violation (NOV) was issued on July 14, 2005, for incomplete testing and recordkeeping. A Compliance Agreement was signed between the City of Albuquerque and the DOE on December 22, 2005, agreeing to meeting the conditions of Permit No. 1705, to perform additional testing, and to apply for a modification to the permit.

Vehicles

The majority of government vehicles at SNL/NM are owned and managed by the General Services Administration (GSA). All GSA vehicles must comply with the same emission standards set for all personal and non-personal vehicles that are issued KAFB vehicle passes. As required by 20.11.100 NMAC, "Motor Vehicle Inspection-Decentralized," Sandia Corporation submits an annual vehicle inventory update and inspection plan to the City of Albuquerque for only one of the nine SNL/NM-owned vehicles.

Emergency Generators
Sandia Corporation operates four main standby diesel generators for emergency power supply to key locations in TA-I. These generators are some of SNL/NM's largest generators, each with a 600-kilowatt (kW) capacity. These generators, permitted by the City of Albuquerque (Chapter 9, Table 9-1) are exercised monthly and their electrical systems are tested quarterly. In 2005, the generator fuel throughput was 5,606 gallons of diesel. Sandia Corporation is permitted a maximum use of 500 hours a year for the main standby generators, which is the same usage assumed for all other on-site generators. Due to the President's directive on Energy and Fuel Conservation, starting in October 2005, the four main generators will only be run for one hour total instead of one hour each.

Open Burns
As required by 20 11.21 NMAC, "Open Burning," DOE obtains open burn permits for each of Sandia Corporation's applicable scheduled event or test series. The regulation differentiates the permit basis into two categories: multiple-event and single-event. The single-event permit was designed to regulate individual burns having significant impact. Open burn permits are shown in Chapter 9, Table 9-1. Open burn permits are required for:

- Disposal of Explosives by Burning (avoids the hazards of transport and handling);
- Aboveground Detonation of Explosives (over 20 lb);
- Burning Liquid Fuel 2,000 gallons or more or solid fuel of 5,000 lb in a single-event research and development activity; and
- Igniting Rocket Motors with greater than 4,000 lb of fuel.

5.5.2 Title V

The CAAA of 1990 contained provisions under Title V requiring all existing major air emission sources to obtain an operating permit. A major source is defined as the combined emissions from any facility with the potential to emit:

- 100 tpy or greater of any criteria pollutant,
- 10 tpy of any HAP, or
- 25 tpy of any combination of HAPs.

Background
The DOE/NNSA/SSO submitted Sandia Operating Permit application 515 (DOE 2002a) on March 1, 1996, since potential emissions for SNL/NM were greater than 100 tpy of criteria pollutants. The City of Albuquerque has yet to issue the final permit. An updated application will be submitted to the City of Albuquerque to reflect current emissions.

Permit Fee Structure
The City of Albuquerque's regulation requires source owners to pay air emission fees, which are implemented under 20.11.02 NMAC, "Permit Fees." Since 1997, source owners were able to submit an inventory of their actual emissions or fuel throughput for the year and pay an annual fee based on this amount. This fee reduction provision was eliminated in a modification to 20.11.02 NMAC that became effective on July 1, 2001. Annual fees are based on an assessed value of a source's maximum allowable to emit regardless of actual emissions. For example, the Steam Plant would be assessed on the assumption that it operated at full capacity year-round. Sandia Corporation, through DOE, applied for a synthetic minor permit to take federally-enforceable limits on its emission sources to remain below the 100 tpy Title V threshold, and took steps towards that goal in 2002 by amending its Title V application, and again in 2003 by submitting a synthetic minor permit application for the Steam Plant. Permit No. 1705 was issued for the Steam Plant in 2004, which permanently reduced annual permit fees. In 2005, Sandia Corporation paid an annual fee of $8,014 based on a rate of $31 per ton of permitted emissions.

5.5.3 Ozone Depleting Substance (ODS) Reductions

Sandia Corporation did not make any progress in 2005 towards the DOE secretarial goal of replacing Class I refrigerant chillers greater than 150 tons capacity, manufactured prior to 1984, by 2005. Replacement is part of a larger upgrade to improve the reliability and the overall efficiency of the associated chilled water system. Buildings 806 (FY06) and 807 (FY09) are scheduled for demolition, so their chillers will be removed at those times.

chapter six

WASTEWATER, SURFACE DISCHARGE, STORM WATER MONITORING PROGRAMS & OIL STORAGE AND SPILL CONTROL

In This Chapter ...

Wastewater Discharge Program
Surface Discharge Program
Storm Water Program
Oil Storage and Spill Control

Environmental Snapshot

There was one reportable petroleum spill in 2005. Approximately 100 gallons of mineral oil was released at the Sandia National Laboratories, New Mexico Reapplication Facility. The contaminated soil was removed from the site and subsequent sampling confirmed that the Total Petroleum Hydrocarbons concentration at the site was below residential exposure standards.

Sandia National Laboratories, New Mexico (SNL/NM) conducts effluent monitoring through wastewater, surface water, and storm water monitoring and surveillance programs. Sandia Corporation complies with water quality regulations established by local, state, and federal agencies. U.S. Environmental Protection Agency (EPA) standards are implemented at the state and local level by the New Mexico Environment Department (NMED) and the City of Albuquerque. Currently, EPA Region VI implements storm water regulations under the National Pollutant Discharge Elimination System (NPDES); SNL/NM's five wastewater monitoring stations are permitted by the City of Albuquerque. Storm water is the only discharge at SNL/NM regulated by NPDES. Sandia Corporation also adheres to the water quality guidelines contained in U.S. Department of Energy (DOE) Orders 450.1, *Environmental Protection Program* (DOE 2005) and 5400.5, *Chg 2, Radiation Protection of the Public and the Environment* (DOE 1993a).

6.1 WASTEWATER DISCHARGE PROGRAM

Wastewater that is discharged to the public sewer system from SNL/NM facilities is divided into two categories: sanitary discharges and industrial discharges. Sanitary waste streams include wastewater from restrooms and showers, food service establishments, and other domestic-type activities. Industrial discharges are produced from general laboratory research operations, including electroplating, metal finishing, microelectronic development, and photographic processes.

Sandia Corporation closely monitors its liquid effluent discharges to meet regulatory compliance. Sandia Corporation further reduces its toxic discharges by implementing Toxic Organic Management Plans (TOMPs) and general good housekeeping and engineering practices. Pollution prevention (P2) measures to reduce, substitute, or eliminate toxic chemicals are implemented, where feasible, as discussed in Section 3.4.

6.1.1 SNL/NM and the City of Albuquerque Sewer System

City of Albuquerque Publicly-Owned Treatment Works (POTW)

SNL/NM's sewer system connects to the City of Albuquerque's sanitary sewer line at four permitted outfalls. SNL/NM also has one additional industrial permitted wastewater outfall (2069G) at the Microelectronics Development Laboratory (MDL), which is upstream of the final discharge location, City of Albuquerque Permit 2069I. Wastewater effluent discharged from any of the five outfalls must meet the City of Albuquerque's Sewer Use and Wastewater Control Ordinance (SUWCO) requirements. SUWCO information can be found at the American Legal Publishing Corporation's website, which publishes the City of Albuquerque's Code of Ordinances:

www.amlegal.com/albuquerque_nm/

All SNL/NM effluent discharge standards were within the City of Albuquerque's SUWCO established limits during 2005.

Wastewater Compliance Awards

The City of Albuquerque's reporting requirements are defined under its SUWCO. The SUWCO specifies the discharge quality and requirements that the City of Albuquerque will accept at its POTW. Sandia Corporation received five "Gold Pre-treatment Awards" from the City of Albuquerque for the 2004 to 2005 reporting year (November 2004 through November 2005). A "Gold Pre-treatment Award" is given based on a facility's 100 percent compliance with reporting requirements and discharge limits set in permits or exceptional source reduction and P2.

6.1.2 Permitting and Reporting

The City of Albuquerque POTW, Liquid Waste Division, implements the EPA's water quality standards under the authority of the SUWCO. Sandia Corporation submits semi-annual wastewater reports to the City of Albuquerque. The primary regulatory drivers for the Wastewater Program and important program documents and reports are listed in Chapter 9.

Discharge Control Program

The Water Quality Group (WQG) at Sandia Corporation maintains a Discharge Control Program to track wastewater discharges resulting from ongoing chemical, manufacturing, and industrial processes conducted at SNL/NM facilities. Facility processes are reviewed for contaminants, concentrations, and discharge frequencies to determine if the effluent

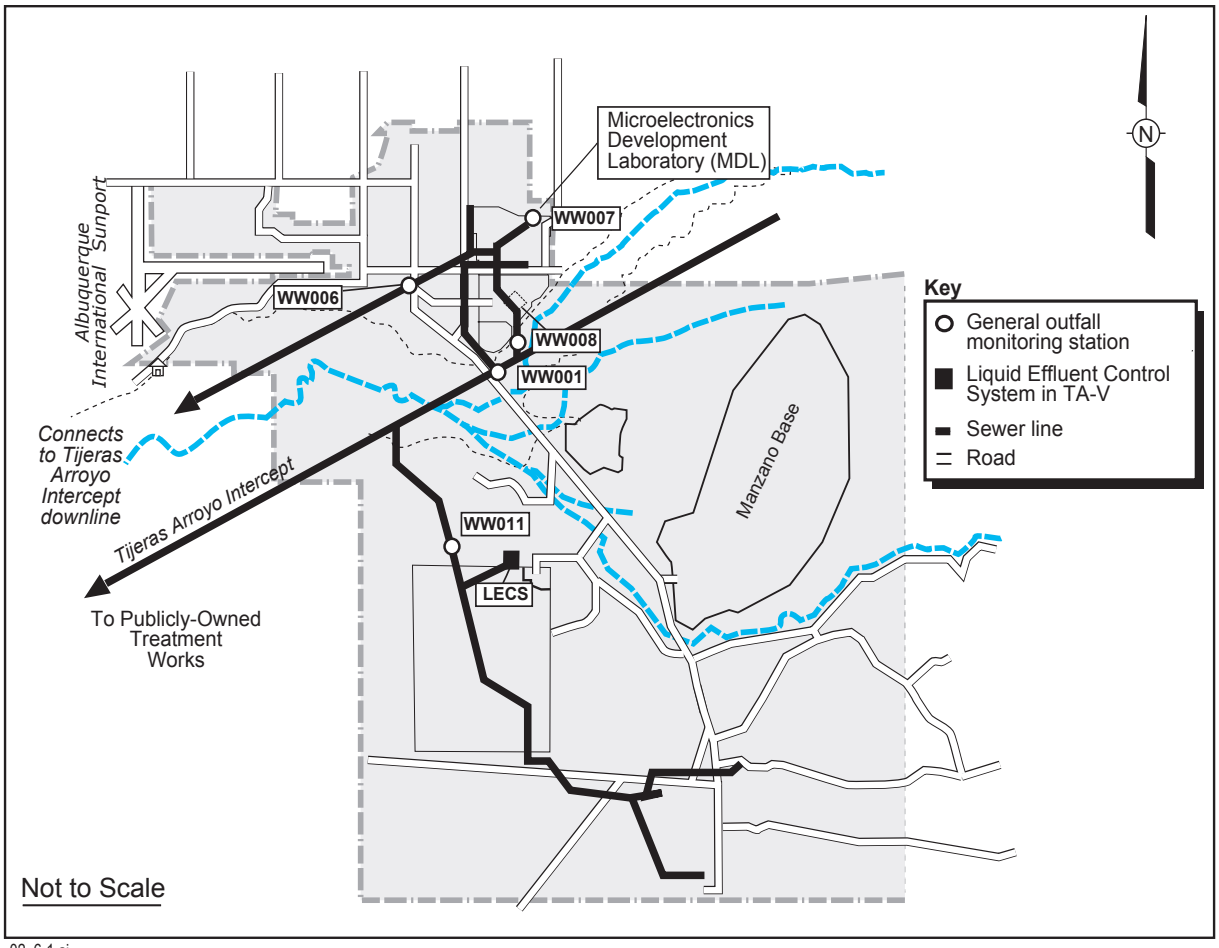


FIGURE 6-1. Wastewater Monitoring Station Locations

will meet regulatory criteria. Once approved, a facility is issued an internal SNL/NM permit, which is reviewed annually. Generally, processes are well characterized and any constituents that are detected over the limits at a wastewater monitoring station can usually be tracked back to the source facility. Corrective actions to mitigate further releases are implemented, as necessary.

One-time releases are approved on a case-by-case basis. Buildings that only produce domestic sewage, such as from lavatories, sinks, and fountains, are not required to obtain an internal permit.

6.1.3 Wastewater Monitoring Stations

SNL/NM has five on-site outfalls permitted by the City of Albuquerque (Figure 6-1). Wastewater permits are listed in Chapter 9, Table 9-1. Four of these stations discharge directly to the public sewer, which flows into the Tijeras Arroyo Intercept and one station is for an upstream categorical pre-treatment process. SNL/NM discharges approximately 800,000-1,000,000 gallons of wastewater per day to the public sewer.

The EPA has established categorical pre-treatment standards for specified classes of industrial discharges. Station WW007 (City of Albuquerque Permit 2069G) monitors the wastewater discharged from the Acid Waste Neutralization (AWN) System at the MDL in Technical Area (TA) I.

Wastewater Monitoring

All outfall stations are equipped with flow meters and pH sensors to continuously monitor wastewater 24 hours-a-day, 365 days-a-year. In the event that permit limits are exceeded, an auto-dialer will contact personnel at SNL/NM and the DOE National Nuclear Security Administration (NNSA) Sandia Site Office (SSO) is required to notify the City of Albuquerque within 24 hours. Wastewater Discharge Permits and Station Characteristics are listed in Table 6-1.

Wastewater Analyte Parameters

Metals
Aluminum, Arsenic, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Zinc

Radiological
Gamma spectroscopy, Gross alpha, Gross beta, Tritium

General Chemistry
chemical oxygen demand (COD), Cyanide, Formaldehyde, Oil and grease, Phenolic compounds, semi-volatile organic compounds (SVOCs), Soluble fluoride, volatile organic compounds (VOCs)

TABLE 6-1. SNL/NM Wastewater Discharge Permits and Station Characteristics

General Outfall	
WW001	All waste streams
WW006	All waste streams
WW008	All waste streams
WW011	All waste streams
Categorical	
WW007	MDL
Not Permitted	
LECS	Radiological screening of TA-V process water

NOTES: "All waste streams" include both domestic and industrial discharges.
TA-V = Technical Area V
LECS = Liquid Effluent Control System
MDL = Microelectronics Development Laboratory

Sandia Corporation splits wastewater samples taken from SNL/NM outfalls with the City of Albuquerque to determine compliance with permit requirements. Also, NMED is notified when sampling is scheduled to occur and is offered the opportunity to obtain samples for analysis. All samples are obtained as 24-hour flow proportional or time-weighted composites. Sandia Corporation sends SNL/NM split samples to an EPA-approved laboratory for analysis. Sampling results are compared with results obtained by the City of Albuquerque. Currently, the procedure is to sample randomly from a list of potential pollutants. The City of Albuquerque determines which parameters it plans to analyze. Station parameters are listed in the shaded box (shown above).

Septic Systems
Sandia Corporation maintains five active septic tank systems in remote areas on KAFB, which are used only for domestic sanitary sewage collection. Since these tanks receive only domestic sewage and no industrial discharges, they do not require sampling prior to pumping and discharge to the public sewer. However, as a Best Management Practice (BMP), Sandia Corporation periodically obtains samples from these active tanks prior to pumping and discharge.

6.1.4 TA-V Radiological Screening
SNL/NM maintains research and engineering reactors in TA-V. These reactors and support facilities have the potential to produce radioactive process wastewater that includes liquids from floor drains, lab sinks and other drains located in buildings that use, process or store radioactive materials. To ensure that all wastewater from these facilities meets regulatory standards, liquid effluent is separated into two process streams defined as reactor and non-reactor wastewater. Non-reactor wastewater is water from restrooms and non-radioactive laboratory activities. Reactor process wastewater from areas that use, process or store radioactive materials is channeled to holding tanks where it can be screened for radiological contaminants within the Liquid Effluent Control System (LECS).

LECS was developed as a control system to maintain the integrity of the City of Albuquerque's sanitary sewer system by collecting, analyzing, and handling SNL/NM reactor process wastewater from TA-

V reactor activities. Water samples are analyzed for tritium, gross alpha, gross beta, and gamma spectroscopy to ensure radiological levels meet regulatory standards before the water is released to the public sewer system. If radioactivity levels are detected above regulatory limits, the water will not be released to the sanitary sewer system and an alternative disposal path will be found or the radionuclides will be allowed to decay in place over a matter of days or weeks if the contamination is due to short-lived medical radioisotopes. Once the activity is at or below regulatory levels, the water can be safely discharged to the public sewer system. The LECS consists of three 5,000-gallon holding tanks with liquid level and radioactive alarm systems, a control room, and an ion exchange/ filtration unit (treatment processor). The LECS is an engineered facility operating within an established safety envelope. Discharges to the sanitary sewer from the LECS and other SNL/NM activities have not exceeded standards for radionuclides at any of SNL/ NM's wastewater monitoring stations.

6.1.5 Summary of Monitoring Results

During 2005, Sandia Corporation split SNL/ NM wastewater samples with both the City of Albuquerque and the NMED. In 2005, laboratory analytical results for these wastewater samples, based on the parameters shown on page 6-4, confirmed that Sandia Corporation was in compliance with all City of Albuquerque regulations. The City of Albuquerque staff also inspected SNL/NM facilities to ensure that Sandia Corporation was in compliance with the City of Albuquerque's discharge requirements. All water discharged from the LECS in 2005 also met federal regulatory standards and DOE Orders for radiological levels in wastewater. All analytical results can be found in Appendix A.

Reportable occurrences and environmental releases in 2005 are discussed in Sections 2.2.1 and 2.2.2. There were no reportable events (City of Albuquerque permit violations) in 2005.

6.2 SURFACE DISCHARGE PROGRAM

All water and water based compounds that discharge to the ground surface are evaluated for compliance with New Mexico Water Quality Control Commission (NMWQCC) regulations as implemented by the NMED's Groundwater Bureau. These regulations are designed to protect the groundwater and surface water of the state for potential use as a domestic potable water source (Table 6-2). The primary regulations and important program documents are listed in Chapter 9.

6.2.1 Surface Discharge Approval and Permitting

Surface discharges are releases of water and water based compounds made to roads, open areas, or impoundments. Surface discharges are only made with the approval of the Internal Surface Discharge Program. Proposed discharges are evaluated for potential contaminants and concentration levels to determine if the discharge complies with strict water quality guidelines for surface releases. Uncontaminated water discharges must also be approved, since large volumes of water discharged in areas of prior contamination (such as Environmental Restoration [ER] sites) could increase infiltration rates and move contaminants deeper into the soil column. If any discharges do not meet surface water quality standards, alternative methods of disposal are found.

2005 Surface Discharge Activities

Surface discharge requests are generally made when access to a sanitary sewer line is not available, such as in remote locations on KAFB where no sewer lines exist. Typical surface discharge requests include discharges made by the Groundwater Protection Program (GWPP) to dispose of well purge water from groundwater monitoring wells. Wells are purged before a representative groundwater sample can be taken. Other surface discharges are requested as a result of fire training activities, the need to flush eyewash stations, and the cleaning of building exteriors. In 2005, 17 individual surface discharge requests were made; all met state standards and were approved by the Surface Discharge Program.

6.2.2 Surface Discharge Releases in 2005

The Surface Discharge Program must be contacted in the event of an accidental release or spill to the ground surface. In 2005, four surface discharge releases were reported to outside agencies. All four were reported to the NMED. Environmental releases and occurrences are briefly summarized below and in Section 2.2.2. One of these releases also met Occurrence Reporting and Processing System (ORPS) criteria as an occurrence.

On June 15, 2005, a water line break occurred within a construction zone near TA-IV. The water was from a ruptured 10-inch water line (domestic potable water and fire suppression). A backhoe struck the line while excavating a trench for a utility system upgrade. It was estimated that approximately 100,000 to 200,000 gallons of water was released. The water flowed across TA-IV in a southeasterly direction and entered the Tijeras Arroyo at two locations. One flow path crossed through two ER sites on the south side of TA-IV. No further action (NFA) requests are pending for both sites. The potential for the movement of contaminants from the site is very low since storm water normally flows through the area. The appropriate repairs were made.

On November 11, 2005, reapplication personnel reported that five hot-cell window units stored in the reapplication services yard leaked mineral oil onto the ground where they had been stored while awaiting shipment back to manufacturer for recycling. The five hot cell windows were received by SNL/NM for use in the medical isotope diagnostic development program. The hot cell windows were never used and were placed in corporate storage in 1998, prior to being moved to the reapplication yard in May of 2005. Each of the five hot cell windows leaked varying amounts of mineral oil totaling approximately 96 gallons. The mineral oil soaked into the ground at the storage location. The groundwater table at the site is in excess of 400 feet and there are no wells, public or private, in the vicinity of the release. The contaminated soil was removed from the site and subsequent sampling confirmed that the Total Petroleum Hydrocarbons concentration at the site was below residential exposure standards. There was no threat to surface water and no evidence of any threat to groundwater. This event met ORPS criteria as an occurrence.

On November 19, 2005, a domestic water and a steam condensate return line failed at the same location. The steam condensate return line developed a leak and the hot steam caused an adjacent domestic water line to fail. The polyvinylchloride (PVC) water line failed when it was heated above 140°F. Excavation of the area to repair the water line showed the steam and condensate in very close proximity to the existing water line. The total estimated release was 2,000 to 3,000 gallons of water and condensate. The condensate is high purity distilled water with some C02. It has a neutralizing amine added to keep the pH neutral to prevent corrosion. Typical pH range is 8.3 to 8.8 with a maximum of 9.2. The majority of the release consisted of domestic water due to the higher line pressure and failure mode. The release did not pose a hazard to surface or groundwater or the environment.

On November 21, 2005 a release of chilled water occurred. The flow of water was stopped and it was determined that the leak was the result of an ongoing incident involving the steam lines. A second release occurred at this location on November 24, 2005, which continued until November 25, 2005. The chilled water failed when the steam return line started to leak, heating the surrounding soil on November 21, 2005. After the November 24, 2005 release, the site was excavated. The total estimated volume from the November 21, 2005 release was approximately 5,000 to 8,000 gallons. The November 24, 2005 release volume was estimated to be 17, 000 to 20,000 gallons of treated water from the thermal storage tank and condensate. Both releases entered the storm water system, but did not pose a hazard to surface or ground water or the environment.

6.2.3 Pulsed Power Evaporation Lagoons

The Surface Discharge Program at SNL/NM reports water quality results from routine samples taken from two surface discharge lagoons in TA-IV. Both lagoons are permitted through NMED in Discharge Plan (DP-530). The two surface discharge lagoons are primarily used to contain and evaporate water that collects in the secondary containments around seven outdoor oil storage tanks used to store dielectric oil. The secondary containments are designed to hold the entire contents of a tank in the event of an accidental release. Significant volumes of precipitation can collect in the containments during storm events. The water is visually inspected for oil contamination and any oil present is skimmed off prior to discharge to the TA-IV lagoons.

The Discharge Plan (DP-530) was approved for SNL/NM Pulsed Power Development Facilities located in TA-IV for Lagoons 1 and 2 on March 8, 1988. The discharge plan was submitted pursuant to 20.6.2.3106 NMAC of the NMWQCC Regulations and was approved pursuant to 20.6.2.3109 New Mexico Administrative Code (NMAC). The current plan will expire renewal 120 days prior to the expiration date of September 21, 2006.

During 2005, both lagoons were drained, cleaned, and inspected (the lagoons were drained to the sanitary sewer after testing prior to discharge). Monthly inspections were performed and documented in checklists filed in the Environment, Safety, and Health (ES&H) and Emergency Management Records Center and with DOE/SSO.

6.3 STORM WATER PROGRAM

6.3.1 Storm Drain System

Storm water runoff flowing over the ground surface has the potential to pick up and transport contaminants. The Storm Water Program works in coordination with the P2 Group, the Surface Discharge Program, Facilities Engineering, and the ER Project to implement measures and BMPs to prevent or reduce potential contaminants from being transported in storm water runoff. Potential contaminants may derive from:

- Oils and solvents from machine shops and manufacturing areas;
- Vehicle residues from streets and parking lots;
- Hazardous chemicals and metals from waste handling facilities;
- Residual radioactive and hazardous constituents from Solid Waste Management Units (SWMUs);
- Building material contaminants from construction activities; and
- Pesticides and fertilizers from landscaped areas.

Sandia Corporation controls the potential contaminants that may be picked up by storm water runoff by routing all industrial waste water to the sanitary sewer and storing most chemicals indoors. SNL/NM also limits storm water contact with chemical storage containers and carefully controls runoff in areas where wastes, chemicals, and oils are stored or handled. Secondary containments for all outdoor oil storage tanks and chemical containers prevent potential pollutants from being transported in storm water runoff. Some facilities, such as the Hazardous Waste Management Facility (HWMF) and the Radioactive and Mixed Waste Management Facility (RMWMF) are designed to divert all runoff from the facility to a lined catchment basin. Water that accumulates in these basins evaporates. If evaporation is not adequate due to meteorological conditions, the accumulated water is evaluated and pumped to either the storm drain system or to the sanitary sewer for disposal. Appropriate approvals must be granted by the state for discharges to the storm drain system or by the City of Albuquerque for discharges to the sanitary sewer. Required approval to outside agencies is obtained through the DOE.

NPDES Regulations

NPDES regulations, under the Clean Water Act (CWA), require any point source discharges to be permitted. Any runoff that flows into the Tijeras Arroyo through a channel, arroyo, conduit, or pipe is considered a discharge point. Overland surface flow or "sheet" flow that drains into Tijeras Arroyo is not considered a point source discharge.

The State of New Mexico has defined "Surface Waters of the State" to include "Waters of the U.S." and all other surface water in the State. In order to assist New Mexico in protecting its water resources

TABLE 6-2. NMWQCC Monitoring and Reporting Requirements

Action	Frequency	Reporting
Inspection of Lagoons	Monthly	Documented in checklists
Drain, clean and inspect lagoon and liner	Annual	Annual
Water-level readings	Annual	Annual
Major cations, anions, and TDS	Biennial	Biennial
Purgeable organics using EPA Method 8240	Biennial	Biennial
Extractable organics using EPA Method 8270	Biennial	Biennial

NOTES: NMWQCC = New Mexico Wather Quality Control Commission
TDS = total dissolved solids
EPA = U.S. Environmental Protection Agency

the EPA can apply NPDES regulations to discharges to New Mexico's surface waters, even if those waters are not "Waters of the U.S."

As shown in Figure 6-2, Tijeras Arroyo enters KAFB from the northeast, flows just south of TA-I, TA-II, and TA-IV, exits at KAFB's west boundary, and continues about eight miles to its discharge point at the Rio Grande River. The arroyo has created a significant topographic feature across KAFB where erosion of unconsolidated basin sediments has resulted in a channel over one half mile wide in some areas.

Watersheds at SNL/NM

NPDES permits are required if storm water runoff discharges to "Waters of the U.S."or "Surface Waters of the State." Sandia Corporation facilities in TA-I, TA-II, and TA-IV have storm drains, culverts, and channels that divert storm water runoff to discharge points on the north side of Tijeras Arroyo, which is classified as "Waters of the U.S." Sandia Corporation also conducts various activities in remote mountain and canyon areas in the Arroyo del Coyote watershed, which empties into Tijeras Arroyo northwest of the KAFB Golf Course. Activities in all of these areas are evaluated for possible NPDES permitting.

Drainages south of the Arroyo del Coyote watershed are generally short and undeveloped. Runoff in this area infiltrates quickly into highly permeable soils. Discharges from these areas do not reach any designated "Waters of the U.S." but they do discharge to "Surface Waters of the State"; therefore, NPDES permits are also required for facilities in this area. TA-III, TA-V, and several remote sites are located in this area.

A new NPDES industrial permit was issued in January 2001. Four stations were added to monitor runoff in the Arroyo del Coyote watershed at that time. The new industrial permit will be issued sometime in 2006. SNL/NM anticipates adding several new monitoring locations for compliance with this permit.

NPDES Permit

The EPA provides regulatory oversight for SNL/NM's Storm Water Program. SNL/NM facilities are covered under the NPDES "Multi-Sector General Permit for Storm Water Discharges Associated With Industrial Activities" issued by the EPA in January 2001 (EPA 2001). Currently, there are nine SNL/NM monitoring points (MPs) on the permit, eight of which collect samples for analytical analysis. This permit was reissued in 2001 for five years and covers four primary industrial activities at SNL/NM as defined in 40 CFR 122. The permit expired in September 2005. The EPA has extended coverage under this permit until a new permit is issued in 2006. Key facilities affected by NPDES regulations are listed in Table 6-3. Chapter 9 lists all applicable regulations and program documents.

Beginning in 2003, construction activities that disturb over one acre (previously was five acres) also require permitting under NPDES. A construction permit requires protection of storm water runoff during and after construction. All areas of the site that are susceptible to erosion must be stabilized upon completion of the project. In December 2005, 12 storm water construction permits and two permit waivers were in effect, one project was pending. Construction permits are listed in Chapter 9, Table 9-1.

6.3.2 Storm Water Monitoring Stations

Figure 6-2 illustrates the location of the nine MPs. 1 through 5 monitor runoff from the majority of industrial activities in TA-I, TA-II, and TA-IV. MP 6,7,9, and 10 monitor discharges in Arroyo del Coyote.

6.3.3 Routine Inspections

All routine inspection results are attached to the Storm Water Pollution Prevention Plan (SWP3). Routine inspections include the following:

- ***Monitoring station inspections*** are conducted monthly to ensure that samplers and other equipment are functioning properly.

- ***Material storage area inspections*** are conducted quarterly. All waste handling areas, vehicle and equipment cleaning areas, and loading and unloading areas are inspected for uncovered and unprotected potential contaminant sources and spills. These inspections increase personnel awareness and responsibility for storm water P2.

- ***Wet weather inspections (visual monitoring)*** are conducted quarterly during a storm event, if

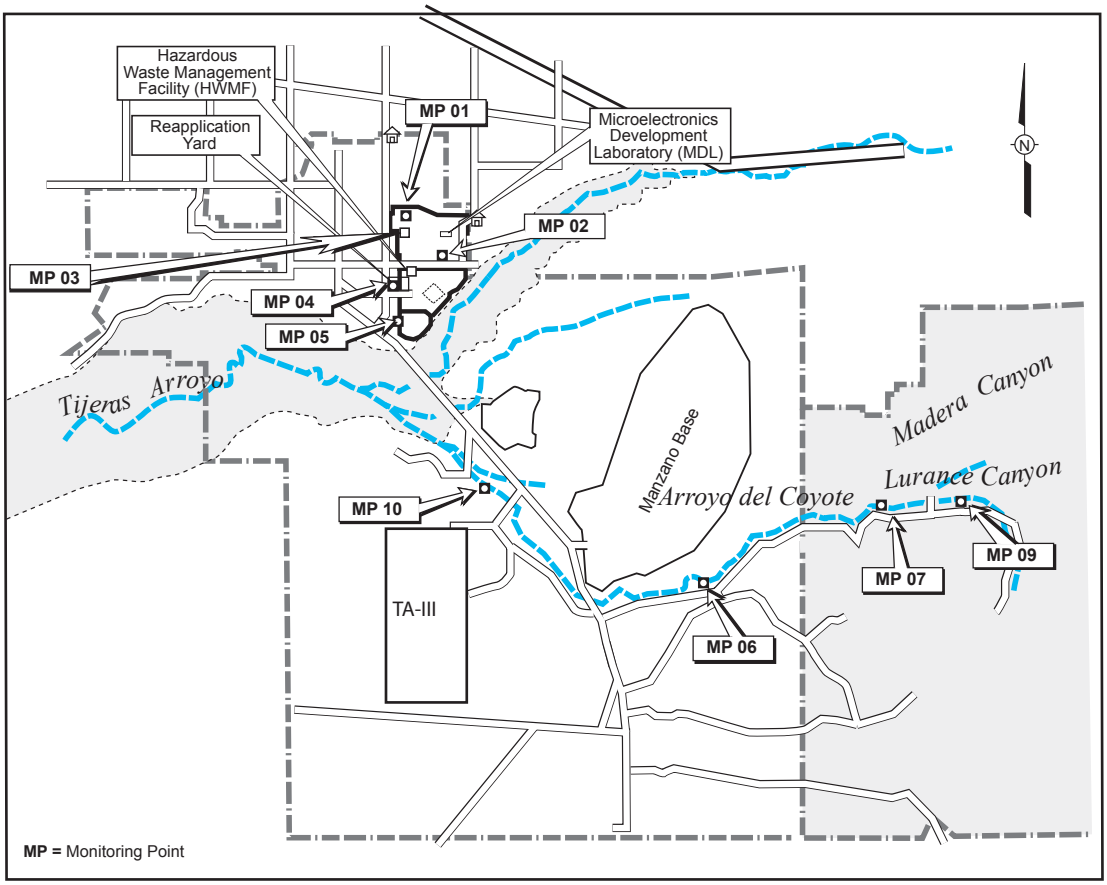


FIGURE 6-2. Storm Water Monitoring Point Locations at Nine Sites

possible, but generally during the rainy season from April through September. Samples are collected and visually inspected for foaminess, clarity, and the presence of oil. The pH of the discharge is also measured and recorded. These inspections also provide an opportunity to check for broken levees and floating debris.

- ***Dry weather inspections*** are conducted quarterly when storm drains and ditches are dry primarily to detect illicit discharges. In general, only storm water is allowed in the storm drain system; however, with approval from the Surface Discharge Program, water that meets NPDES permit conditions can be discharged to storm drains. An example of NPDES permit-approved discharges would be water used during fire training exercises or fire hydrant testing. Dry weather inspections also provide an opportunity to inspect ditches for excess vegetation, accumulated sediment, and debris. Storm channels are cleaned out annually, or as necessary.

- ***Annual Inspections*** of all permitted facilities and the entire storm water system are conducted. After the inspections have been completed, a report is generated indicating the extent of the inspections and certifying that SNL/NM is in compliance with NPDES permit. Any inconsistency between the SWP3 and conditions at the facilities is noted in the report. If changes to the SWP3 are required as a result of these inspections, revisions to the SWP3 are initiated. If potential pollution problems are uncovered at the facilities, this is also noted in the report along with a schedule for addressing the problem areas.

Sampling Protocols

The NPDES permit requires quarterly analytical sampling to be conducted in the second and fourth year of the five-year permit, weather permitting. Due to Albuquerque's semi-arid climate and high infiltration rates, precipitation rarely produces adequate runoff for monitoring in the months of October through March (Figure 6-3). In general, the most consistent storm water sampling occurs during the rainy season from April through September. After a rainfall of sufficient intensity and duration

TABLE 6-3. SNL/NM Facilities Subject to Storm Water Permitting

These facilities are in areas where storm water can potentially drain to Tijeras Arroyo.

Description of SIC Code*	Potential Pollutants and Impacts	Applicable SNL/NM Facilities **
NPDES Multi-Sector Storm Water Permit		
Scrap and Waste Recycling	- Various solid objects with potential residual surface contamination	- Reapplication and Storage Yard
Hazardous Waste Treatment, Storage, or Disposal Facilities	- Regulated hazardous chemical and radioactive waste	- HWMF - Manzano Storage Complex - SWMUs (including those in Lurance and Madera Canyons)
Electronic and Electrical Equipment Manufacturing	- Raw chemical storage such as acid and sodium hydroxide - Electroplating processes	- MDL - AMPL - CSRL
Fabricated Metal Products	- Metal Fabrication - Drilling - Turning - Milling	- Machine Shop
Short-Term Construction Permits		
Major Construction Activities in 2005	- Building material pollutants - Disturbed soil	- MESA - CINT - WIF

NOTES: *The EPA requires a National Pollution Discharge Elimination System (NPDES) Storm Water Permit for all industrial facilities that have processes defined in the Standard Industrial Classification (SIC) codes listed in Appendix A of 40 CFR 122.
**Applicable facilities are monitored under the expanded Storm Water Program, which was in effect in October 2001. The expanded program is documented in the revised Storm Water Pollution Prevention Plan (SWP3) (SNL 2001b).

AMPL = Advanced Manufacturing Process Laboratory
CSRL = Compound Semi-Conductor Research Laboratory
HWMF = Hazardous Waste Management Facility
SNL/NM = Sandia National Laboratories, New Mexico
WIF = Weapons Integration Facility
MDL = Microelectronics Development Laboratory
MESA = Microsystems and Engineering Sciences Applications
SWMU = Solid Waste Management Unit
CINT = Center for Integrated Nano-Technologies

(as defined in the regulation), storm water runoff flowing through each monitoring station is collected as a grab sample by the automatic sampler. The discharge is collected within the first 30 minutes of the runoff event to allow for the sampling of any residues picked up in the soil upstream of the station. All samples are sent to off-site laboratories and analyzed according to protocols established by the EPA.

6.3.4 2005 Activities

2005 Sampling Results

Quarterly visual sampling was conducted in 2005. Analytical sampling was not required for this year of the permit.

Visual samples were collected at the five MPs in the developed TAs in the first and third quarters of FY05. Visual observations are not conducted at the remote MPs due to personnel safety concerns in the remote areas during inclement weather. No visual observations were made during the second and fourth quarter of FY05 due to lack of runoff or the runoff occurred outside normal business hours. The visual observations that were performed in FY05 were conducted as described under "wet weather inspections." No unusual characteristics were noted.

6.4 OIL STORAGE AND SPILL CONTROL

SNL/NM has an oil storage capacity of 3.6 million gallons in 56 aboveground storage tanks (ASTs) and underground storage tanks (USTs). This does not include oil-containing equipment and transformers. Additional oil storage capacity in fifty-five gallon drums occurs throughout the site on an as needed basis. All oil storage sites with regulated containers must be equipped with secondary spill containment. Secondary containment structures include concrete lined basins, retaining walls, containment reservoirs, earthen berms, sloped pads, trenches, and containment pallets.

A Spill Prevention Control and Countermeasures (SPCC) Plan is required under the CWA. SNL/NM's SPCC Plan was revised in 2005 to incorporate

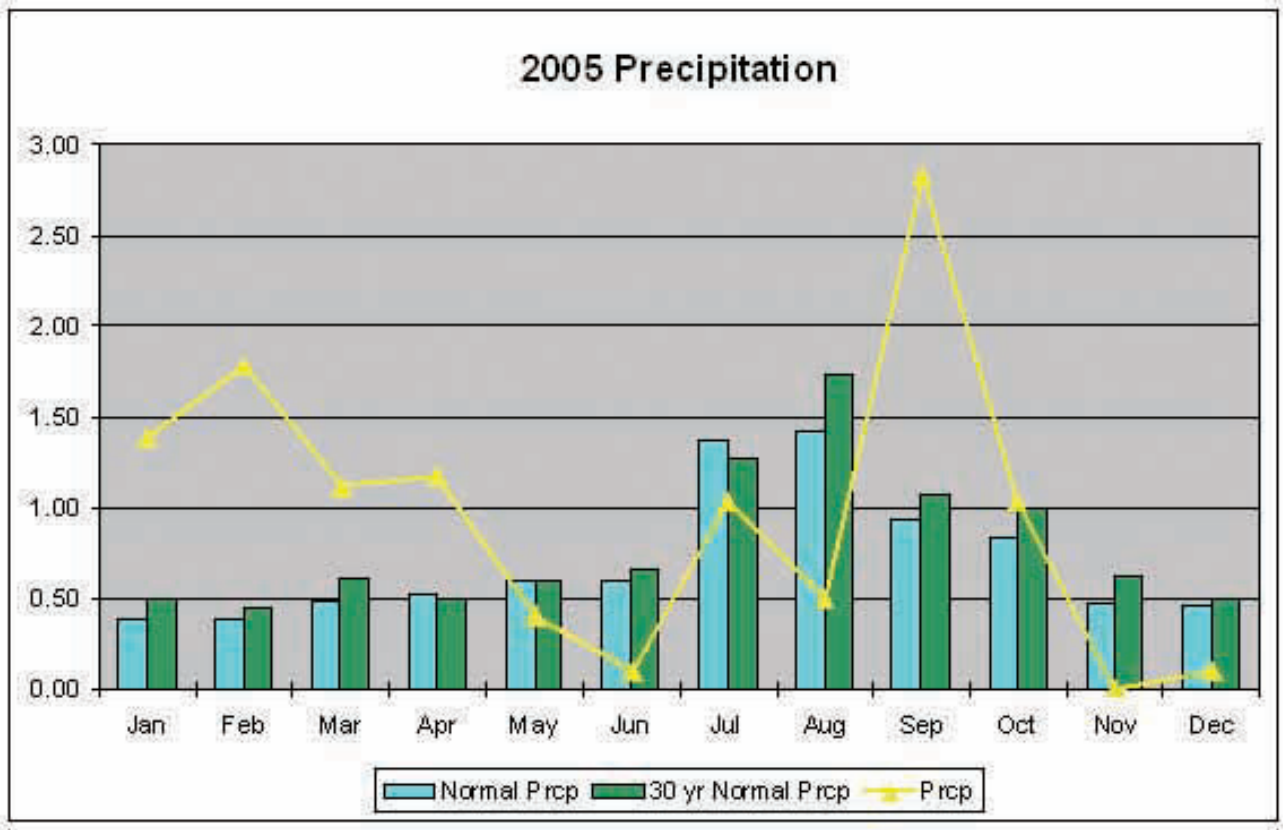


FIGURE 6-3. 2005 Albuquerque Precipitation

changes to 40 CFR 112 and NMAC 20.5. The focus of these regulations is to protect specifically defined waterways, or "navigable waters of the United States" from potential oil contamination. "Navigable waters" is a broad term that includes rivers, lakes, oceans, and water channels (tributaries) such as streambeds and arroyos that connect to a river. This applies to the Tijeras Arroyo, which discharges to the Rio Grande.

Sandia Corporation's SPCC Plan describes oil storage facilities and the mitigation controls in place to prevent inadvertent discharges of oil. Facilities at SNL/NM subject to the regulations include:

- Oil storage tanks (USTs and ASTs),
- Bulk storage areas (multiple containers),
- Temporary or portable tanks.

Table 9-1 lists the permit numbers for those tanks that are registered with the NMED. SNL/NM's State of New Mexico Owner ID Number is 14109.

USTs

There are two, 20,000 gallon, fiberglass USTs at SNL/NM that are registered with the State of New Mexico. One additional UST that is used solely for emergency power generation is exempt from the New Mexico requirements but is covered by federal regulations in 40 CFR 280. Two USTs in TA-III are exempt from state and federal requirements because they contain insignificant quantities of regulated substances.

ASTs

SNL/NM currently operates 51 ASTs. In 2002, the State of New Mexico passed oil storage regulations that required the registration of all oil storage tanks with a storage capacity greater than 1,320 gallons but less than 55,000. SNL/NM has seven ASTs that are subject to the New Mexico specific regulations. Two new 5,000 gallon ASTs were installed in 2005. One 25,000 gallon AST was closed.

There was one reportable petroleum spill to an outside agency (NMED) on November 11, 2005. Approximately 100 gallons of mineral oil was released at the SNL/NM Reapplication Facility. This spill also met DOE ORPS criteria as an occurrence and is discussed in Section 2.2 and 6.2.2.

This page intentionally left blank.

chapter seven
GROUNDWATER PROGRAMS

Environmental Snapshot

The Groundwater Protection Program is responsible for tracking information on all wells owned by Sandia Corporation, including Environmental Restoration Project wells and characterization boreholes. The primary purpose of the Groundwater Protection Program Well Registry and Oversight task is to ensure that all wells owned by Sandia Corporation are properly constructed and maintained to protect groundwater resources.

In This Chapter ...

The Groundwater Protection Program (GWPP) and the Environmental Restoration (ER) Project collect groundwater data at Sandia National Laboratories, New Mexico (SNL/NM). Both programs coordinate to monitor wells throughout SNL/NM operational areas, and ER sites. Groundwater monitoring is conducted on an annual, biannual, or quarterly basis, depending on individual project areas. Water level measurements are conducted quarterly and monthly.

Specific tasks performed in Fiscal Year (FY) 2005 by the GWPP and ER are shown in Figure 7-1. As shown in Figure 7-1, coordination with outside groundwater monitoring agencies is a key component of the GWPP and the ER Project.

Figure 7-2 shows groundwater wells located on and around Kirtland Air Force Base (KAFB). Wells shown in Figure 7-2 include ER monitoring wells, GWPP surveillance wells, City of Albuquerque production wells, KAFB production wells, U.S. Geological Survey (USGS) monitoring wells, and KAFB Installation Restoration Program (IRP) wells. In FY05, 78 wells were sampled by the GWPP or the ER Project and are shown in Figure 7-2. Perchlorate sampling was suspended on KAFB wells in FY 2005.

Please note, groundwater data is reported for the FY05 (from October 1, 2004 through September 30, 2005).

7.1 OVERVIEW OF GROUNDWATER PROGRAMS AT SNL/NM

7.1.1 GWPP Activities

The primary function of the GWPP is to conduct groundwater surveillance monitoring to detect groundwater contamination from current operations or undiscovered legacy contamination. The following outlines the specific purpose of surveillance monitoring:

- Establish baseline water quality and groundwater flow information for the groundwater system at SNL/NM;
- Determine the impact, if any, of Sandia Corporation's operations on the quality and quantity of groundwater; and
- Demonstrate compliance with all federal, state, and local groundwater requirements.

The GWPP is responsible for tracking information on all wells owned by Sandia Corporation, including ER Project wells and characterization boreholes. The primary purpose of the GWPP Well Registry and Oversight task is to ensure that all wells owned by SNL/NM are properly constructed and maintained to protect groundwater resources. The GWPP works together with SNL/NM well owners to review new well design proposals, record construction information, track well ownership and maintenance records, perform annual well inspections, and consult with owners, if and when plugging and abandonment of a well or borehole is required.

In 2005, groundwater surveillance sampling was conducted at 14 wells. One new well (SWTA3-MW4) was installed in the southwest corner of TA-III. The new well is completed across the water table and is a companion to SWTA3-MW3, which is at the same location and has a lower screened interval.

U.S. Department on Energy (DOE) Orders, the New Mexico Environment Department (NMED) Compliance Order on Consent (COOC), and regulations applicable to the GWPP are listed in Chapter 9 and are discussed in Chapter 2.

Trend Data

The GWPP performs trending on groundwater surveillance results by comparing past years' data with current year results. Trend plots for analytes exceeding maximum contaminant levels (MCLs) and human health related maximum allowable concentration (MACs) are presented in Appendix B, which provides statistical descriptors and graphical representation. Data are analyzed to determine if the results are within a normal range of expected values or if a significant difference is present. By doing so, early detection and possible source identification can be made when contaminants are at levels far below regulatory concern. Conversely, unchanging baseline levels demonstrate Sandia Corporation's successful best management practices (BMPs) for groundwater protection.

7.1.2 ER Project Groundwater Activities

ER Project activities are directed by Resource Conservation and Recovery Act (RCRA) regulations that mandate the cleanup and management of

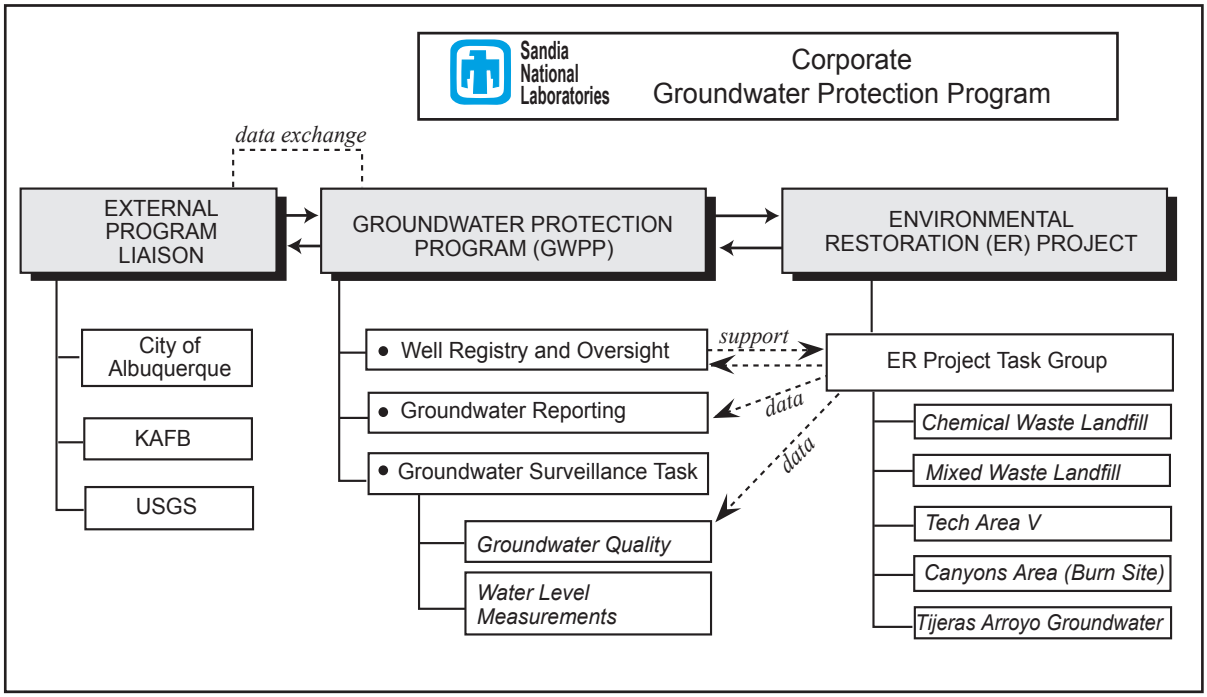


FIGURE 7-1. SNL/NM's Groundwater Programs and Interfaces

active and inactive treatment, storage, and disposal (TSD) facilities. The NMED COOC also provides requirements. Applicable regulations are listed in Chapter 9. The regulatory basis for the ER Project is discussed in Section 3.2.

There are currently five ER Project areas with ongoing groundwater investigations:

Chemical Waste Landfill (CWL)

Mixed Waste Landfill (MWL)

Technical Area (TA) V Groundwater Investigations

Tijeras Area Groundwater (TAG) Investigations (TA-I, TA-II & Tijeras Arroyo)

Canyons Area (Lurance Canyon Burn Site) Groundwater Investigation

Drain and Septic Systems (DSS)

CWL – The CWL is a 1.9-acre former disposal site located in the southeastern corner of TA III at SNL/NM. From 1962 until 1985, the CWL was used for the disposal of chemical (through 1982) and solid waste (through 1985) generated by SNL/NM research activities. Additionally, a small amount of radioactive waste was disposed of during the operational years of the CWL. In 1985, groundwater monitoring began at the CWL as required by the interim status standards of the RCRA contained in the 40 CFR 265, Subpart F, and the State of New Mexico Hazardous Waste Management Regulations. Groundwater sampling at the CWL is conducted in conformance with procedures outlined in the "Sampling and Analysis Plan for Groundwater Assessment Monitoring at the Chemical Waste Landfill," Appendix G, Revision 4 of the CWL Final Closure Plan (SNL/NM 1992) and associated NMED-approved revisions (Dinwiddie 1998, Bearzi 2000, and Kieling 2003). Currently, there are 13 active wells in the network. Two wells are dry wells and are not sampled since associated screen intervals were partially filled with sediment during vapor extraction activities, two of the wells are background (upgradient) wells, and three wells are multi-completion wells with two separate screen intervals.

In May of 2000, the NMED approved the following changes to Appendix G, Revision 4: Biannual frequency (every other year) for Appendix IX constituents, and Semiannual frequency (twice a year) for VOCs and metals. During March and April 2003, two deep-completion wells were installed adjacent to the landfill (CWL-MW7 and CWL-MW8) to complete the chromium investigation as

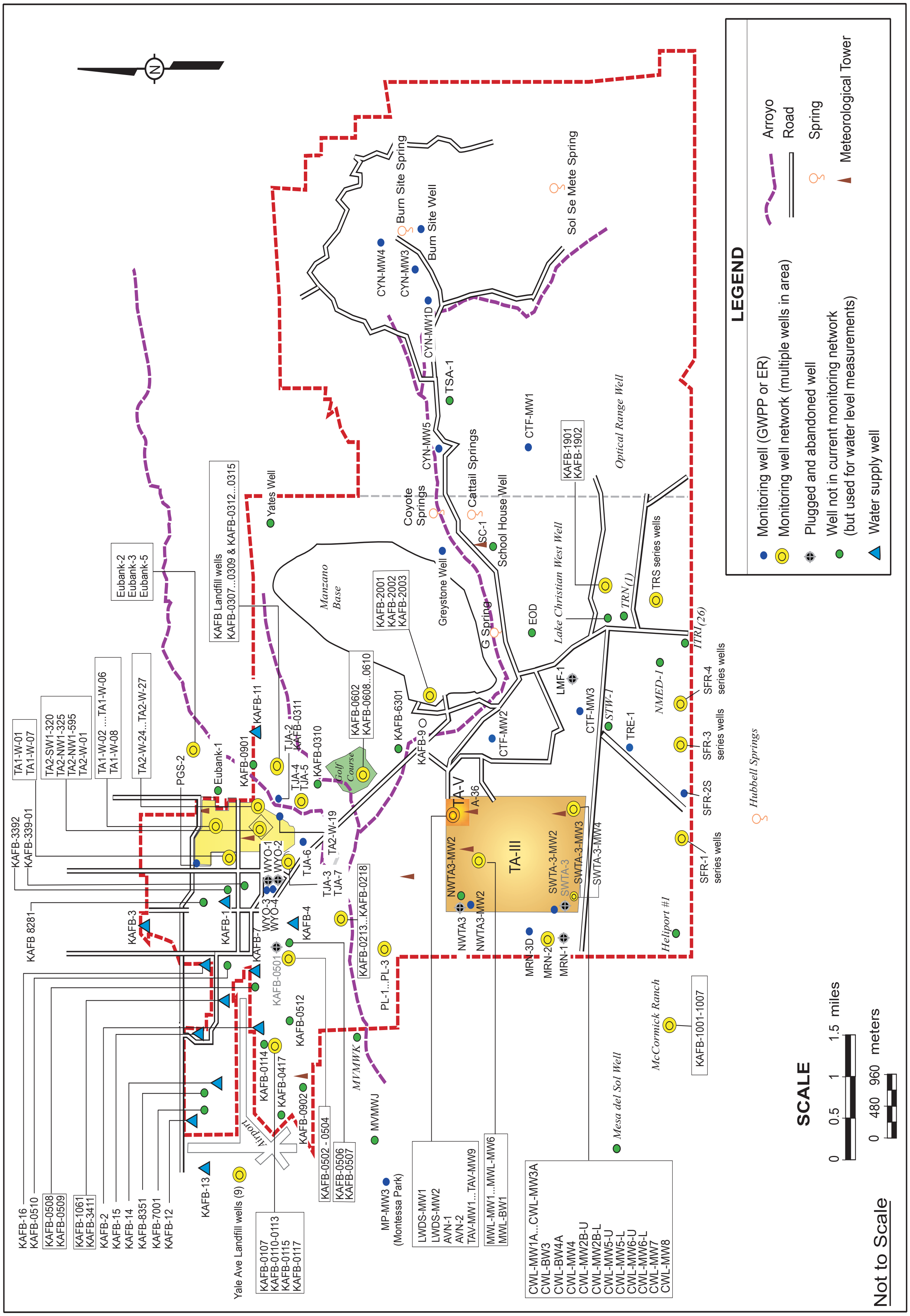


FIGURE 7-2. Wells and Springs on SNL/NM and KAFB

required by NMED. As per direction from NMED, these two wells were to be sampled at a quarterly frequency for volatile organic compounds (VOCs) and metals for a minimum of eight quarters or events. The CWL is discussed further in Section 7.2.2.

MWL – The MWL is a 2.6-acre site located in TA-III that was operational from 1959 to 1989 and was used to dispose of low-level radioactive and mixed waste (MW). Tritium is the primary contaminant of concern (COC) that has been released from the MWL. Other COCs include various radionuclides, heavy metals, and VOCs. The groundwater monitoring network at the MWL consists of seven wells.

TA-V – The Gamma Irradiation Facility (GIF), the Hot Cell Facility (HCF), and two reactor facilities are located in TA-V. From 1967 to 1971, the Liquid Waste Disposal System (LWDS) located in TA-V was used to dispose of reactor coolant water to the soil column. Groundwater COCs at the LWDS are nitrates and VOCs such as trichloroethene (TCE), which was first detected in the groundwater in 1993. There are currently 13 active monitoring wells at this site.

TAG – The TAG Investigation includes groundwater beneath TA-I, TA-II, and the Tijeras Arroyo. In FY05, there were 25 monitoring wells routinely sampled in the TAG study area. Of these, 14 are regional aquifer wells and 11 are perched groundwater system wells. The perched system consists of water-bearing strata located above the regional groundwater system (water table) that have insufficient yield to be developed for domestic use. TCE and nitrates are the COCs for TAG.

Canyons Area – The Canyons Area is located around the active Lurance Canyon Burn Site (LCBS) facility. Groundwater investigations were initiated in 1997 at the request of NMED after elevated nitrate levels were discovered in the LCBS water well. In 1997, one groundwater monitoring well was installed, and in 1999, two additional wells were installed, including two piezometers to detect and monitor groundwater flow at the interface of the arroyo sediments and bedrock. To date, both piezometers have remained dry. Three new wells were installed in 2005; data will be reported in 2006.

DSS–The four DSS groundwater monitoring wells were installed in August 2001 to determine if COCs from effluent releases at four solid waste management units (SWMUs) have impacted groundwater. Per the requirements of an NMED-approved sampling and analysis plan, quarterly sampling of these four wells occurred for eight quarters (two years). Groundwater sampling was completed from July 2002 and June 2004, and the analytical results were used to justify a Corrective Action Complete status for SWMUs associated with the four DSS groundwater monitoring wells. Three of the DSS SWMUs Corrective Action Complete proposals have been approved by NMED, and the fourth one is pending.

7.2 GROUNDWATER QUALITY ANALYSIS RESULTS

Analytical results for groundwater quality monitoring conducted by the GWPP and the ER Project are compared to state, federal and DOE guidelines as shown in Table 7-1. The frequency of groundwater monitoring performed at SNL/NM is shown in Table 7-2. All groundwater samples are analyzed in accordance with U.S. Environmental Protection Agency (EPA) protocols.

Water quality results for both the GWPP and the ER Project are summarized in the following pages and in Table 7-3. Please note that all exceedances appear in Table 7-4 on page 7-14.

7.2.1 GWPP Surveillance Results

During August 2005, annual sampling of groundwater was conducted by the GWPP Groundwater Surveillance Task. Samples were collected from 14 wells. Groundwater surveillance samples for the GWPP were analyzed for the following parameters: VOCs, dissolved metals (except for mercury), selected radionuclides, gross alpha & beta activity, major ions including nitrate, alkalinity/total phenols, total halogenated organics (TOX), gamma spectroscopy, selected radionuclides, and gross alpha/beta activity.

The water sample from NWTA3-MW2 was analyzed for perchlorate in addition to the above listed analytes. The perchlorate analyses were conducted per the requirements of the COOC finalized by NMED in 2004. Metals, excluding mercury, were analyzed from filtered groundwater samples to conform to New Mexico Water Quality Control Commission (NMWQCC) Standards for dissolved concentration

TABLE 7-1. Guidelines Used for Groundwater Quality Sample Comparisons

Regulation/Requirements	Standards and Guides	Regulating Agency
National Primary Drinking Water Regulations (40 CFR 141)	Maximum contaminant level (MCL)	U.S. Environmental Protection Agency (EPA)
New Mexico Water Quality Control Commission (NMWQCC) [1] Standards for Groundwater (20 6.2 NMAC)	Maximum allowable concentration (MAC)	NMWQCC
DOE Drinking Water Guidelines for Radioisotopes [2] (DOE Order 5400.5)	Derived concentration guide (DCG)	Department of Energy (DOE 1993a)

NOTES: [1] MACs for Human Health and Domestic Water Supply Standards are identified in the analytical results tables in the appendices. Domestic water supply standards are based on aesthetic considerations, not on direct human health risks.
[2] DOE drinking water guidelines set allowable radionuclide levels in drinking water. The levels are calculated based on published DCGs and correspond to a 4 millirem-per-year (mrem/yr) dose from chronic exposures. This is equivalent to 4 percent of the DCG for ingestion, which is based on an exposure of 100 mrem/yr. These may be different than EPA's standards, where established.

TABLE 7-2. Sample Collection Periods for Groundwater Quality Monitoring at SNL/NM During FY05

Sampling Period	GWPP	CWL	MWL	TA-V	TAG	CYN
Oct 04					√	
Nov 04		√	√	√		√
Dec 04				√		
Jan 05		√			√	
Feb 05		√	√			√
Mar 05				√		√
Apr 05		√	√		√	
May 05				√	√	
Jun 05				√		√
Jul 05					√	
Aug 05	√			√	√	
Sep 05				√		√

limits. An unfiltered groundwater sample from each well was analyzed for total mercury.

In addition, field measurements taken at each well included alkalinity, turbidity, dissolved oxygen, pH, specific conductivity, oxidation reduction potential (or redox [Eh]), and temperature.

VOCs

No groundwater samples exceeded MCLs for VOCs. Trace concentrations of acetone, toluene, carbon disulfide, methylene chloride, bromoform and chloroform were detected. Only bromoform and carbon disulfide were detected at quantifiable values above the reporting limits. Carbon disulfide was detected in the duplicate sample for MRN-3D but not in the environmental sample. Bromoform was detected in the sample from MRN-2 at a concentration of 1.74 µg/L.

Although there is no specific MCL established for chloroform or bromoform, an MCL of 0.1 µg/L is established for total trihalomethanes. Chloroform and bromoform are trihalomethanes. In drinking water systems, trihalomethanes are the bi-product of a disinfection with chlorine containing chemicals. The MAC established by the NMWQCC for chloroform specifically is 100 µg/L.

Non-metal Inorganic Compounds and Phenolics

No groundwater samples exceeded established MCLs for any of the following non-metallic inorganic constituents: nitrate plus nitrite (NPN) (as nitrogen), phenolics, TOX, total cyanide, alkalinity (calcium carbonate), anions (bromide, chloride, fluoride, and sulfate).

Chloride exceeded the NMWQCC domestic use MAC for groundwater in water samples collected from CTF-MW2. Sulfate in SFR-4T exceeded the domestic use MAC. The fluoride concentration in groundwater samples from CTF-MW2, TRE-1, SFR-2S, and SFR-4T exceeded the MAC for the Human Health Standard of 1.6 mg/L. The elevated concentrations are from natural sources and are consistent with background concentrations determined for these locations.

No perchlorate was detected in NWTA3-MW2 at concentrations above the action level of 4.0 µg/L.

TABLE 7-3. Summary of SNL/NM Groundwater Monitoring Activities During Fiscal Year 2005

	Remediation	Environmental Surveillance		
Number of Active Wells Monitored	65	13		
Number of Samples Taken	194	15		
Number of Analyses Performed	14,424	1,786		
Percent of Analyses that are Non-Detect	85.53 percent	74.92 percent		
	Remediation	**Environmental Surveillance**	**MCL**	**MAC**
Range of Results for Positive Detections				
Tritium (pCi/L)	ND	ND	N/A	N/A
TCE (µg/L)	0.257 – 17.5	ND	0.005	100,000
Chloroform (µg/L)	0.372 - 0.479	0.961	N/A	100
Other VOCs (µg/L)				
Acetone	1.27 - 7.23	1.84-6.5	N/A	N/A
Methylene chloride	2.25 - 4.61	2.06 - 2.27	N/A	N/A
Trace Metals (mg/L) / (MCL, MAC)				
Aluminum	0.00818 - 1.24	0.00596 - 0.0205	N/A	5
Antimony	0.000288 - 0.000798	ND	0.006	N/A
Arsenic	***0.00143 - 0.0572***	0.00218 - 0.00365	0.01	0.1
Barium	0.0187 - 0.445	0.0114 - 0.445	2	1
Beryllium	0.000105 - 0.00303	0.000119 - 0.00016	0.004	N/A
Cadmium	0.000054 - 0.000426	ND	0.005	0.01
Calcium	33.6 - 669	36.3 - 669	N/A	N/A
Chromium	***0.000562 - 0.236***	***0.961 - 0.961***	0.1	0.05
Cobalt	0.000067 - 0.00982	0.00109 - 0.00209	N/A	0.05
Copper	0.000449 - 0.0135	0.000103 - 0.00169	1.3	1
Fluoride	0.076 - 2.17	0.000668 - 0.0103	4	1.6
Iron	0.0933 - 7.15	0.294 - 2.52	N/A	1
Lead	0.000051 - 0.002	ND	0.015	0.05
Magnesium	8.89 - 103	3.17 - 103	N/A	N/A
Manganese	0.00103 - 3.23	0.00558 - 0.14	N/A	0.2
Mercury	ND	ND	0.002	0.002
Nickel	0.000625 - 0.424	0.00112 - 0.0275	N/A	0.2
Potassium	1.61 - 43.8	1.72 - 16.1	N/A	N/A
Selenium	0.00135 - 0.043	0.00284 - 0.043	0.05	0.05
Silver	0.000065 - 0.00281	0.000693 - 0.00281	N/A	0.05
Sodium	15.2 - 547	22.1 - 1120	N/A	N/A
Thallium	0.000023 - 0.00127	0.000406 - 0.000459	0.002	N/A
Uranium	0.000342 - 0.0271	0.00031 - 0.0271	0.03	5
Vanadium	0.00204 - 0.032	0.00201 - 0.032	N/A	N/A
Zinc	0.00128 - 0.0494	0.00389 - 0.117	N/A	10
Other Contaminants				
Nitrate as N (mg/L)	***1.1 - 26***	2.3 - 2.3	10	10
Nitrate plus Nitrite	***0.0164 - 27.1***	0.176 - 5.36	10	10

NOTES: ***Analytes whose observed values exceed MCL and/or MAC are shown in bold italics***

ER = Environmental Restoration
pCi/L = picocurie per liter
µg/L = micorgram per liter
mg/L = milligram per liter
N/D = not detected
GWPP = Groundwater Protection Program
N/A = not applicable
MCL = maximum contaminant level
MAC = maximum allowable concentration

Metals
The analyses were conducted for dissolved metals on filtered groundwater samples, except for mercury, for which the total concentration was determined in an unfiltered aliquot of sampled groundwater. The groundwater standards of the NMWQCC are based on dissolved concentration.

Manganese exceeded the MAC of 0.2 mg/L in CTF-MW2. Iron was determined above the MAC of 1.0 mg/L in wells CTF-MW2 and Eubank-l. Manganese and iron have established MACs for aesthetic purposes and not for health considerations.

Radionuclide Activity
Radioisotopic analyses were conducted on all samples. Specific analyses included: Gamma spectroscopy, gross alpha & beta, radium-226 and -228, uranium-233/234, and uranium-235 and -238.

Gamma spectroscopy analyses indicated the presence of radium, uranium, and thorium-isotopes in some of the groundwater samples. However, gamma spectroscopy is not the analytical tool of choice for what are primarily alpha particle emitting radionuclides. More reliable results for these isotopes were obtained from isotopic specific activities obtained by alpha spectroscopy.

Uncorrected gross alpha results for samples from SFR-2S and TRE-1 exceeded the MCL of 15.0 pCi/L. When the results are corrected by subtracting the uranium activity, the results for SFR-2 and TRE-1 are below the MCL.

All groundwater samples were analyzed for uranium-234, -235/236, and -238. The activities for uranium-234 in the groundwater sample from TRE-1 exceeded the DOE drinking water guideline of 20.0 pCi/L. Wells with elevated uranium are located east of the Tijeras fault complex (Figure 7-3). In this region, groundwater contacts bedrock material that contains minerals that are naturally high in uranium. Although the analysis for isotopic uranium-234 in TRE-1 exceeds the DOE drinking water guideline, the total uranium concentration is below the newly promulgated EPA MCL for total uranium of 30 µg/L (40 CFR 141).

7.2.2 ER Project Water Quality Results

CWL Results
SNL/NM performed FY05 groundwater sampling at the CWL during November 2004, January/February 2005, and April 2005. Groundwater monitoring at the CWL is a compliance-driven activity with specific requirements mandated in Appendix G of the *Chemical Waste Landfill Final Closure Plan* (SNL 1992) and associated NMED-approved revisions (Dinwiddie 1998, Bearzi 2000, and Kieling 2003). Samples were collected from 11 monitoring wells.

Analytes Sampled
Semiannual sampling was performed at CWL-BW3, CWL-BW4A, CWL-MW2BL, CWL-MW2BU, CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, and CWL-MW6U. Three quarterly sampling events were performed at monitoring wells CWL-MW7 and CWL-MW8. Analytes included Appendix IX VOCs, total and dissolved RCRA Appendix IX metals plus iron, total and dissolved chromium and nickel, hexavalent chromium, perchlorate, and tritium. All analytical results were compared with MCLs and MACs.

VOCs
No VOCs were detected above established MCLs and MACs, where applicable.

Metals
As required by the NMED's Hazardous Waste Bureau (HWB), all metal samples were analyzed for total metals. Dissolved metal samples were collected and analyzed from the two deep wells. No metal parameters were detected above established MCLs or MACs, except total chromium. In November 2004, total chromium was detected above both the MCL of 0.1 mg/L and MAC of 0.05 mg/L in CWL-BW3 at a concentration of 0.236 mg/L. In April 2005, total chromium was detected above the MAC only in CWL-BW3 at a concentration 0.0644 mg/L. No other parameters were detected above established MCLs or MACs.

Elevated chromium concentrations correlate to increased field turbidity measurements and are more common if sampling is less frequent than quarterly. Chromium is thought to be a result of corrosion of the stainless steel well screens used in these wells. Wells at the CWL constructed with PVC well screens have significantly lower chromium concentrations. The

stainless steel corrosion product is in a particulate form. As such, the chromium is unlikely to migrate in the groundwater so as to present a hazard to a potential receptor.

Hexavalent Chromium

Hexavalent chromium analysis was performed at CWL-MW7 and CWL-MW8. Hexavalent chromium was not detected above the associated laboratory method detection limits in any groundwater samples. Hexavalent chromium was reported at a concentration of 0.0907 mg/L in the April 2005 CWL-MW7 duplicate sample but was qualified as unusable. The result was flagged with an "R" (unusable) notation during data validation. Historical results indicate no presence of hexavalent chromium. In addition, associated total chromium results were not detected above the method detection limit of 0.001 mg/L. Hexavalent chromium is a component of the total chromium concentration.

Perchlorate and Tritium

SNL/NM collected perchlorate samples were collected at CWL-BW3, CWL-BW4A, CWL-MW4, CWL-MW6L, and CWL-MW6U. Tritium samples were collected from CWL-MW2BL, CWL-MW2BU, CWL-MW4, and CWL-MW6U. Perchlorate was not detected above the MDL of 0.004 mg/L in any groundwater sample. Tritium activities were not detected above associated minimum detectable activities (MDA) in any sample.

MWL Results

Annual groundwater sampling of the seven monitoring wells at the MWL was conducted in April 2005. Groundwater samples were analyzed for VOCs, SVOCs, total and dissolved Target Analyte List (TAL) metals and total uranium, NPN, major anions, perchlorate in selected wells, gamma-emitting radionuclides, gross alpha-beta, isotopic plutonium, strontium-90, and tritium. Per the COOC, perchlorate samples were collected from MWL-BW1 and MWL-MW1 in November 2004 and February 2005.

VOCs and Semi-volatile Organic Compounds (SVOCs)

No VOCs or SVOCs exceeded EPA MCLs in any MWL wells. Groundwater samples from the MWL wells showed no detections for VOCs greater than the practical quantitation limits (PQLs). Acetone was detected in samples from MWL-MW2 and MWL-MW4 at estimated concentrations less than the PQL, but above the method detection limit (MDL). Acetone was also detected at estimated concentrations in samples from MWL-MW1 and MWL-MW3, but the results were qualified as non-detect due to similar acetone concentrations in one or more quality control (QC) blank samples. Acetone is a common laboratory contaminant.

Analysis results for SVOCs showed an estimated concentration, less than the PQL but greater than the MDL, for the common laboratory contaminant bis(2-ethylhexyl) phthalate. SVOCs were only analyzed in samples from MWL-MW2 and MWL-MW3.

Major Anions and Perchlorate

NPN (reported as nitrogen) was detected in all monitoring wells at levels below the MCL of 10 mg/L. No perchlorate was detected at or above the action level of 4 mg/L as specified in the COOC. Perchlorate was analyzed in samples from MWL-MW1, MWL-MW2, MWL-MW6, and MWL-BW1.

Metals

No metals exceeded EPA MCLs or health-based MACs. Nickel concentrations in MWL-MW1 exceeded the irrigation MAC of 0.2 mg/L. Elevated nickel concentrations in this well are believed to be due to corrosion of the well's stainless-steel screen.

Radionuclide Activities

Groundwater samples from MWL wells were analyzed for gamma-emitting radionuclides, gross alpha/beta activity, isotopic plutonium, isotopic uranium, strontium-90, and tritium. Radionuclide activities were not detected above MCLs with one exception. Gross alpha activity was detected in one sample from MWL-MW4 at the uncorrected value or 24.5 picocuries (pCi)/L, or 22.3 pCi/L corrected (by subtracting the contributing activity from uranium). Confirmatory reanalysis of this sample showed an uncorrected gross alpha activity of 11.1 pCi/L, and a corrected gross alpha activity of 8.9 pCi/L. Gross alpha activity in the field duplicate sample from MWL-MW4 showed an uncorrected activity of 4.0 pCi/L, and a corrected activity of 1.81 pCi/L.

No other radionuclides were detected above standards. Gamma spectroscopy analyses did not detect any isotopes above associated MDAs. Neither tritium, plutonium isotopes, nor strontium-90 were detected above MDAs. Total uranium concentrations did not exceed the EPA MCL.

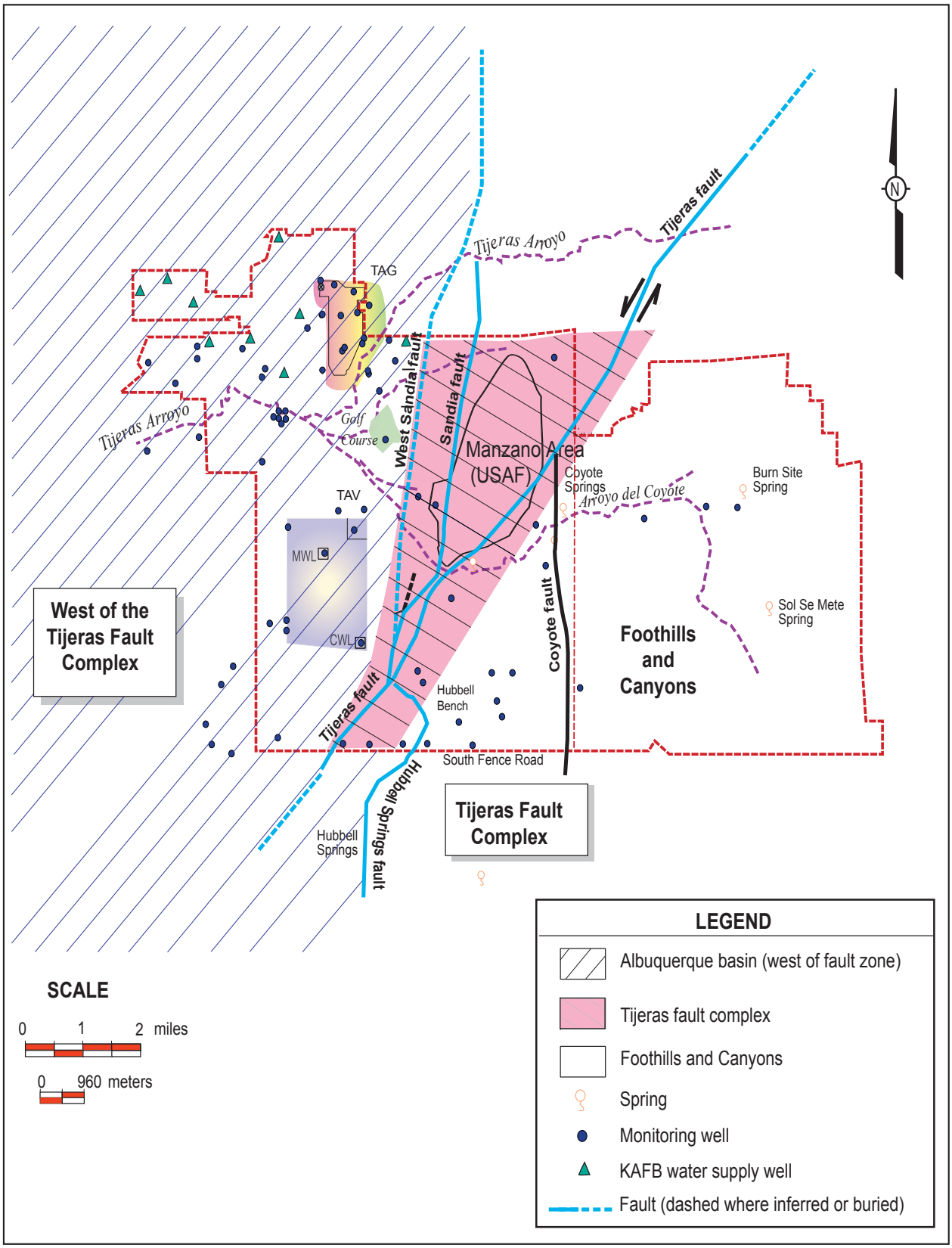


FIGURE 7-3. Hydrogeologically Distinct Areas at KAFB

TA-V Results

Quarterly groundwater sampling at TA-V was performed in November/December 2004, March 2005, May/June 2005, and August/September 2005. Samples were collected from 13 monitoring wells in the vicinity of TA-V.

Analytes Sampled

Groundwater samples were analyzed for VOCs, NPN, cations (calcium, magnesium, and sodium), anions bromide, chloride, fluoride, and sulfate), and alkalinity. Additional samples were collected from select wells and analyzed for SVOCs, TAL metals, total uranium, thorium, tritium, gross alpha-beta, radium-226, radium-228, radionuclides by gamma spectroscopy, ethane, methane, ammonia, dissolved organic carbon, chemical oxygen demand, orthophosphate, manganese 2+, iron 2+, and carbon dioxide. The later set of analytes are used to interpret the potential for and extent of natural degradation of organics at the site.

VOC Analyses

VOCs were detected in samples from TA-V wells at concentrations exceeding MCLs in monitoring well LWDS-MW1. Table 7-4 lists the concentrations in LWDS-MW1 that exceeded the TCE MCL of 5 mg/L. TCE concentrations in LWDS-MW1 are consistent with or demonstrate a slight decrease over previous sampling periods.

SVOC Analyses

Fifteen SVOC analytes were detected in May and June 2005 samples, with hexachlorobenzene and pentachlorophenol detected in TAV-MW1 above the MCL of 1.0 ug/L at concentrations of 92.9 ug/L and 67.4 ug/L, respectively. These detected SVOC compounds are considered suspect, since these compounds have not been historically detected in groundwater samples and laboratory QC issues with the associated laboratory control sample and matrix spike samples. No SVOCs were detected in TAV-MW1 during the subsequent quarterly sampling event.

Inorganic and Other Chemical Analyses

Nitrate concentrations exceeded the MCL of 10 mg/L in LWDS-MW1 for three of the four quarters of FY05.

Metals

In FY05, dissolved metal analyses were conducted for select wells. No metal concentrations exceeded established MCLs.

Radionuclide Activities

Groundwater samples were analyzed for gross alpha, gross beta, tritium, and gamma spectroscopy. Gamma spectroscopy analysis did not detect any isotopes above associated MDAs, except for short-lived unsupported daughter products. All radionuclide activities in the samples collected from TA-V wells in FY05 were below MCLs and DOE drinking water guidelines, where established.

TAG Results

TAG wells are either screened in the regional aquifer or within the perched system several hundred feet above the regional aquifer. COCs include TCE and nitrate, which have been detected at concentrations exceeding the EPA's established MCLs for drinking water. Based on the requirements of the TAG Investigation Work Plan, five wells were dropped from routine sampling and three City of Albuquerque wells associated with the closed Eubank Landfill were added. In sum, samples were collected from 25 wells. There were 11 perched groundwater system wells and 14 regional aquifer wells sampled in FY05.

Samples from each well were analyzed for VOCs, major ions, alkalinity, and nitrate. Additional analytes used to evaluate potential nitrate sources and evaluate the natural attenuation of contaminants were included. The additional analytes were: ferrous iron, manganese II, total phosphorous, total organic carbon (TOC), total Kjeldahl nitrogen, and ammonia.

VOC Analyses

TCE was detected in groundwater samples of several wells in the perched system. Monitoring well WYO-4 had TCE concentrations above the MCL in three of the four quarters. Another perched system well, TA2-W-19 had a TCE concentration above the MCL in the January 2005 sample.

Inorganic Chemical Analyses

Nitrate exceeded the MCL of 10 mg/L in four wells (TJA-4, TJA-7, TA2-SW1-320, and TA2-W-19) during the FY05 sampling events. Nitrate concentrations in TJA-4, TJA-7, and TA2-SW1-320 are generally stable with a slight decrease over time

(Appendix B). The nitrate concentration in one of the wells, TA2-W-19, only slightly exceeded the MCL during one sampling event. All other inorganic analytes were below MCLs, where established.

Canyons Area Results

Quarterly sampling was conducted on four Canyons Area wells located in Lurance Canyon near the SNL/NM Burn Site facility. The samples were analyzed for VOCs, SVOCs, High Explosives (HE), diesel range organics, gasoline organics, major ions including perchlorate (CYN-MW1D only, per the COOC), NPN, TAL metals, uranium, thorium, radium-226, radium-228, gross alpha-beta, tritium, and radionuclides by gamma spectroscopy.

Organic Analyte Results

Two VOCs and six SVOCs were detected in Canyons Area wells but were all at "J" qualified values. ("J" data qualifier indicates an estimated constituent concentration that was detected but is below the laboratory PQL.) Several of the VOCs and SVOCs are common laboratory contaminants and likely are not present in the groundwater. Low levels of diesel range organics were detected. The highest value of 75.4 µg/L was detected in the sample for CYN-MW1D. Gasoline range organics were detected in CYN-MW4 at a concentration of 28.9 µg/L. No MCLs have been established for either diesel range organics or gasoline range organics.

Inorganic Analyte Results

Fluoride exceeded the MAC of 1.6 mg/L for all samples collect in FY05 from CYN-MW1D. The NPN MCL of 10 mg/L was exceeded in samples collected during one of the four quarters in CYN-MW1D and during three of the four quarters in CYN-MW3. No perchlorate above the 4 µg/L action level was detected in the September 2004 sample from the CYN-MW1D well.

Metals Results

No metal concentrations above MCLs were detected in any of the wells sampled in FY05.

Radiological Results

Groundwater samples were analyzed for gross alpha, gross beta, tritium, and gamma spectroscopy. All radionuclide activities were below MCLs and DOE drinking water guidelines, where established. Gamma spectroscopy analysis did not detect any isotopes above associated MDAs, except for short-lived unsupported daughter products.

7.3 WATER LEVELS

Water levels are a means to assess the physical changes of the groundwater system over time. This includes changes in the local water table, the quantity of water available, as well as the direction and speed of groundwater movement. The GWPP gathers groundwater level measurements from a large network of wells on and around KAFB. In addition to wells owned by SNL/NM, data is solicited for the U.S. Air Force (USAF) IRP, the City of Albuquerque, and the USGS wells. In 2005, data from 142 wells were incorporated into the monitor well water level database. Water levels were measured monthly or quarterly.

7.3.1 Regional Hydrology

Groundwater Conceptual Model

A brief overview of the regional hydrology is given in Chapter 1, Section 1.5 of this report. Although water levels may fluctuate over the course of the year in response to seasonal recharge and groundwater withdrawal, the overall level of the regional aquifer within the basin continues to decline at about 1 foot per year. Most of the City of Albuquerque and KAFB water supply wells are completed in the coarser-grained layers of the upper and middle units of the Santa Fe Group. The regional aquifer is located within these units of the Santa Fe Group.

Water level information, with respect to the regional water table in the KAFB area, can be categorized into three general areas. Groundwater levels east of the Tijeras fault complex are approximately 100 to 150 ft below the surface. The water table west of the Tijeras fault complex and the Sandia fault are approximately 500 ft or more below the surface. Between the east and west region is a transition zone that is comprised of the fault complex. The aquifer system within the fault complex and to the east is not well understood due to the complex geology and the limited number of wells available to characterize the system.

Regional Water Table

The Regional Water Elevation Contour map for SNL/KAFB 2005 is presented in Figure 7-4. The extent of the contoured map area was constructed using static water level data from 53 wells west of the Tijeras Fault Complex and represents the water table in period spanning September/October 2005. Generally, these wells are screened across the

regional water table in the upper unit of the Santa Fe Group. They penetrate different depths into the aquifer, and have various lengths of screened intervals. Although most of the water level data represent an unconfined water table, some water levels may represent semi-confined conditions.

The contour lines shown on Figure 7-4 represent lines of equal elevation of the groundwater table. Groundwater withdrawal as a consequence of pumping by KAFB production wells at the northern part of the KAFB and nearby City of Albuquerque production wells has created a depression in the regional water table. This "U" shaped depression with the top of the "U" pointing north, extends south to the Isleta Pueblo, and is a result of preferential flow through highly conductive ancestral Rio Grande fluvial deposits, which are the primary aquifer material in this area. Groundwater flow is perpendicular to the contour lines in the direction of decreasing elevation. The direction of groundwater flow within the region is toward the production wells. This pumping induced flow to the north is in contrast with the southwesterly flow direction reported in 1961 at a time of significantly lower groundwater withdrawl (Bjorklund and Maxwell 1961).

Perched Groundwater System Wells

A Perched Groundwater System Wells exists in the northern part of KAFB in the vicinity of SNL/NM TA I, II, and III and extending southward to the location of the former KAFB sewage lagoons. The eastward extent of the perched groundwater system wells is under the KAFB Landfill and to the southeast the KAFB Golf Course. The elevation data of the highest water interval in the perched groundwater system wells are illustrated in Figure 7-5. The contours indicate a gradient to the east-southeast. The western-most elevation contour near the eastern edge of the former lagoons is at 5,153 feet above sea level (fasl). This elevation corresponds to a depth to water from the surface of approximately 207 ft. At the same location, the regional water table is at 495 ft below the ground surface. Along the eastern boundary of the perched groundwater system wells the elevation of first water is at 5,006 fasl. This elevation is similar the elevation of the regional water table, which is 4,928 fasl at this location. Because of the eastern dip of the perched groundwater system wells and the western dip of the regional system, the two systems appear to merge near this location.

Groundwater Recharge and Loss

The dynamics of water table fluctuations, as reflected by water levels in individual wells, are a balance between groundwater inflow to the basin, recharge, water withdrawal, and basin outflow. Recharge to the groundwater in the Middle Rio Grande basin occurs primarily through mountain front recharge and infiltration from active arroyos, washes, and rivers within the basin.

Recharge potential to the groundwater system is directly related to the amount of precipitation. The regional climate for the Albuquerque basin area is semi-arid as described in Chapter 1. KAFB water production wells supply most of the water used by SNL/NM and KAFB. KAFB production wells extract groundwater from the upper and middle units of the Santa Fe Group at a depth of up to 2,000 ft. These units constitute the primary aquifer for the Albuquerque Metropolitan Area. In 2005, KAFB pumped approximately 1.13 billion gallons (3,467 acre-ft) of groundwater from ten water supply wells. In comparison, 1.07 billion gallons (3,068 acre-ft) of water were pumped for the same period of time in 2004.

7.3.2 Groundwater Level Trends

In 1993, the USGS conducted a study on the Santa Fe Group and the Albuquerque area and found that the quantity of water in the aquifer was significantly less than previously estimated (Thorn et al. 1993). The imbalance between recharge and groundwater withdrawal has resulted in a general decline in water levels. Figure 7-6 shows the contour map of the annual water table elevation changes recorded for the western area of KAFB over the one year period between 2004 and 2005.

The largest amount of decline over the period is approximately 1.3 ft/yr, a higher rate of decline than the previous year's decline of 1.0 ft/yr. The largest declines continue to be in the vicinity of McCormick Ranch, which is located along the southeastern border of KAFB with the Isleta Pueblo Reservation. In the eastern portion of the mapped area, including TA-III, water levels show moderate declines. In contrast to the trend of water level declines throughout most of the region, the water levels in the northeast portion of the mapped area are increasing slightly. This area coincides with a potential recharge area associated with Tijeras Arroyo. The water level trends for the Perched groundwater system wells systems indicate

a decrease in water level elevations in the western portion of KAFB (Figure 7-7). The water level elevations in the central part of the system seem to be relatively stable. The water levels in the eastern part appear to be increasing, which is consistent with the notion that the Perched groundwater system wells is draining to the east and merging with the regional system.

TABLE 7-4. Summary of Exceedances at Sampling Wells in Fiscal Year 2005

SAMPLE	WELL	CONCENTRATION	PERIOD
CHLORIDE MAC = 250 mg/L	CTF-MW2	446 mg/L	August 2005
SULFATE MAC = 600 mg/L	SFR-4T	1910 mg/L	August 2005
FLUORIDE MCL = 4.0 mg/L MAC = 1.6 mg/L	CTF-MW2	2.17 mg/L	August 2005
	TRE-1	1.67 mg/L	August 2005
	SFR-2S	1.68 mg/L	August 2005
	SFR-4T	2.52 mg/L	August 2005
	CYN-MW1D	1.62 mg/L	November 2004
	CYN-MW1D	1.76 mg/L	March 2005
	CYN-MW1D	2.07 mg/L	June 2005
	CYN-MW1D	1.95 mg/L	September 2005
MANGANESE MAC = 0.2 mg/L	CTF-MW2	3.23 mg/L	August 2005
IRON MAC = 1.0 mg/L	CTF-MW2	3.23 mg/L	August 2005
	Eubank 1	3.57 mg/L	August 2005
URANIUM - 234 DOE Drinking Water Guideline = 20.0 pCi/L	TRE-1	22.1 pCi/L	August 2005
TOTAL CHROMIUM MCL = 0.1 mg/L MAC = 0.05 mg/L	CWL-BW3	0.236 mg/L	November 2004
	CWL-BW3	0.0644 mg/L	April 2005
TRICHLOROETHENE (TCE) MCL = 5 µg/L	LWDS-MW1	17.4/17.5 µg/L (dup)	November/December 2005
	LWDS-MW1	17.5/17.1 µg/L (dup)	March 2005
	LWDS-MW1	17.0 µg/L	May/June 2005
	LWDS-MW1	15.3 µg/L	August/September 2005
HEXACHLOROBENZENE MCL = 1 µg/L	TAV-MW1	92.9 µg/L	May/June 2005
PENTACHLOROPHENOL MCL = 1 µg/L	TAV-MW1	67.4 µg/L	May/June 2005
NITRATE (AS NITROGEN) MCL = 10 mg/L	LWDS-MW1	11.1/11.0 mg/L (dup)	November/December 2004
	LWDS-MW1	10.6/11.0 mg/L (dup)	March 2005
	LWDS-MW1	11.2 mg/L (dup)	August/September 2005
PERCHED SYSTEM WELLS			
TRICHLOROETHENE (TCE) MCL = 5 µg/L	WYO-4	7.35/7.43 µg/L (dup)	October 2004
	WYO-4	5.66/6.16 µg/L (dup)	January 2005
	WYO-4	7.82 µg/L	July/August 2005
	TA2-W-19	5.32/5.6 µg/L (dup)	January 2005

See notes at end of table

TABLE 7-4. Summary of Exceedances at Sampling Wells in Fiscal Year 2005 (concluded)

SAMPLE	WELL	CONCENTRATION	PERIOD
PERCHED SYSTEM WELLS			
NPN (AS NITROGEN) MCL = 10 mg/L	TA 2-SW1-320	25.1 mg/L	October 2004
	TA2-SW1-320	20.1 mg/L	January 2005
	TA2-SW1-320	18.9 mg/L	April/May 2005
	TA2 –SW1-320	24.5 mg/L	July/August 2005
	TA2-W-19	10.3 mg/L	October 2004
	TJA-7	27.1/23.2 mg/L (dup)	October 2004
	TJA-7	21.2/21.7 mg/L (dup)	January 2005
	TJA-7	22.3 mg/L	April/May 2005
	TJA-7	18.3/25.9 mg/L (dup)	July/August 2005
	REGIONAL AQUIFER WELLS		
	TJA-4	20.2 mg/L	October 2004
	TJA-4	21.9 mg/L	January 2005
	TJA-4	26.4 mg/L	April/May 2005
	TJA-4	20.3/20.6 mg/L	July/August 2005
NPN MCL = 10.0 mg/L	CYN-MW1D	22.0 mg/L	November 2004
	CYN-MW3	11.5 mg/L	November 2004
	CYN-MW3	11.1 mg/L	March 2005
	CYN-MW3	11.4 mg/L	September 2005

GROSS ALPHA MCL = 15 pCi/L	WELL	ACTIVITY	CORRECTED ACTIVITY*	PERIOD
	SFR-2S	28.3 pCi/L	3.04 pCi/L	August 2005
	TRE-1	32.2 pCi/L	3.14 pCi/L	August 2005

NOTES: dup = duplicate µg/L = micrograms per liter
mg/L = milligrams per liter pCi/L = picocuries per liter
MCL = maximum contaminant level MAC = maximum allowable concentration
* Uncorrected gross alpha results for samples from SFR-2S, and TRE-1 exceeded the MCL of 15.0 pCi/L. When the results are corrected by subtracting the uranium activity, the results for SFR-2 and TRE-1 are below the MCL.

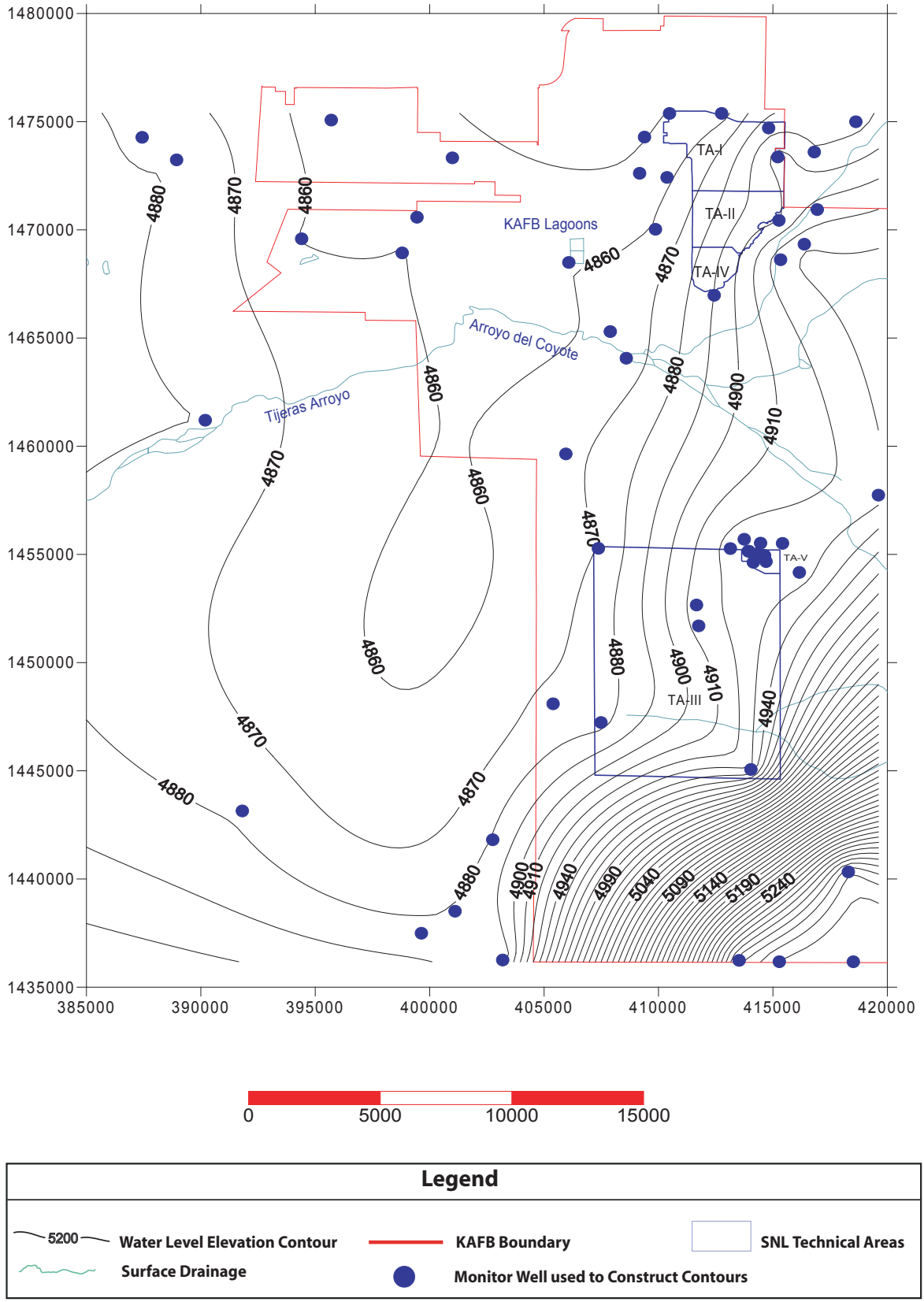


FIGURE 7-4. Regional Groundwater Elevation Map for SNL/KAFB, 2005

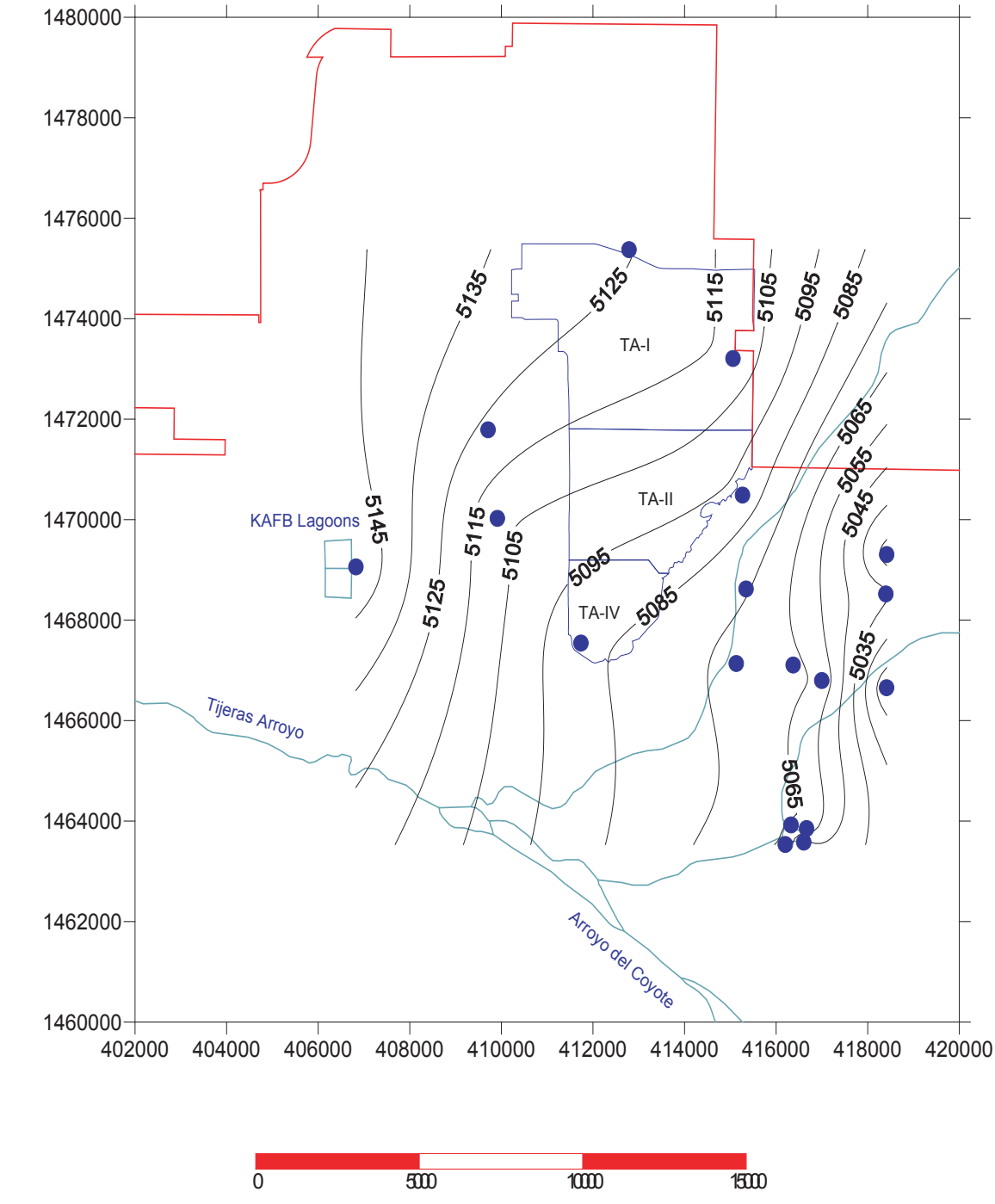


FIGURE 7-5. Perched Groundwater System Water Elevation Map

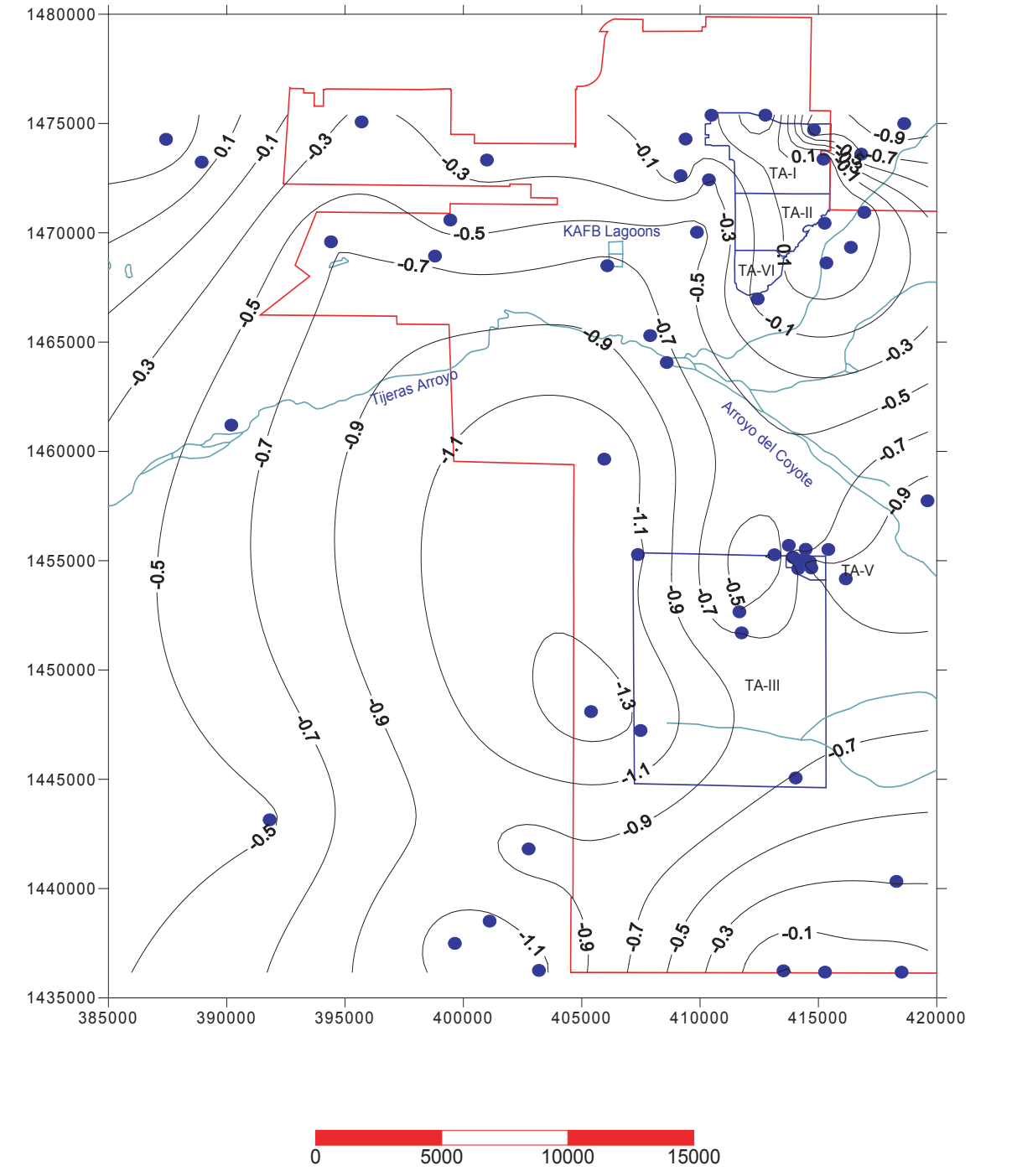


FIGURE 7-6. Annual Water Table Elevation Changes, 2004-2005

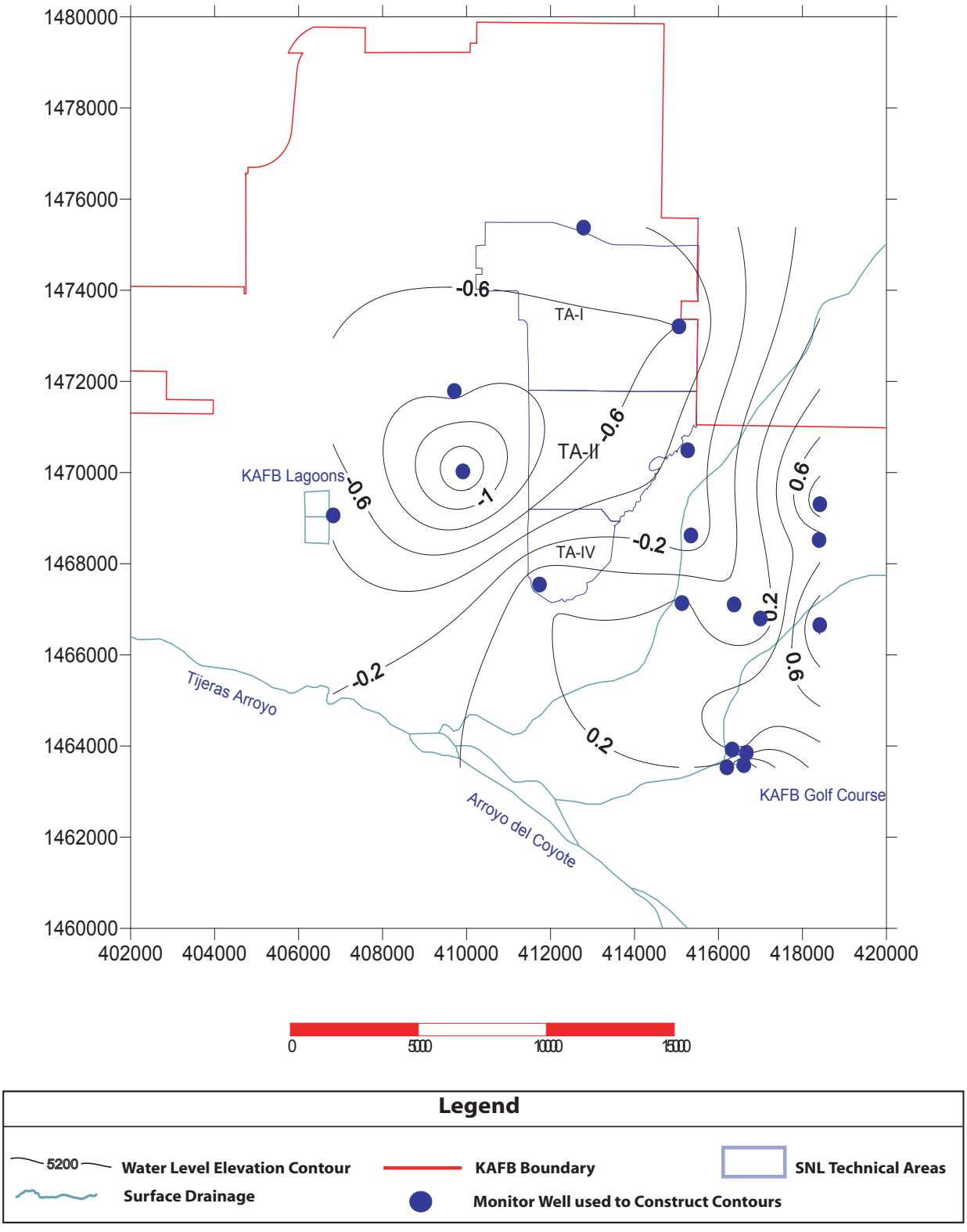


FIGURE 7-7. Perched Groundwater System Elevation Changes, 2004-2005

This page intentionally left blank.

chapter eight

QUALITY ASSURANCE

In This Chapter ...

Environmental Snapshot

In 2005, the Sample Management Office processed a total of 10,433 samples in support of Sandia Corporation projects. Of these, 3,690 were for environmental monitoring and surveillance projects.

8.1 CORPORATE LEVEL QUALITY ASSURANCE (QA)

Sandia National Laboratories, New Mexico (SNL/NM) takes a management systems approach to integrate the applicable U.S. Department of Energy (DOE) Orders and other customer requirements, including adherence to Code of Federal Regulations (CFRs). The SNL Integrated Laboratory Management System (ILMS) CPSR 001.3, is the business rule that defines a uniform management system approach for accomplishing this integration activity.

The SNL/NM Corporate Work Process (CWP) CPR 001.3.4, is the business rule that describes the process-level approach for implementing the ILMS management principles and constituent elements.

These two approaches are used to integrate and implement the ten QA criteria contained in the Corporate Quality Assurance Program (QAP) CPR 001.3.2, with the safety requirements contained in CPR 400.1.2, "Integrated Safety Management System (ISMS)."

Corporate Quality Assurance Program

The SNL/NM QAP defines requirements, assigns responsibilities and authorities, and provides criteria for the management, performance, and assessment of work.

QA Criteria

The QA requirements are taken from DOE Order 414.1C "Quality Assurance," and 10 CFR 830.120 Subpart A "Quality Assurance Requirements."

Ten criteria are applied to all scope of work and implemented in accordance with the level of formality using the graded approach.

Management:
Criterion 1 - Program
Criterion 2 - Personnel Training and Qualification
Criterion 3 - Quality Improvement
Criterion 4 - Documents and Records

Performance:
Criterion 5 - Work Processes
Criterion 6 - Design
Criterion 7 - Procurement
Criterion 8 - Inspection and Acceptance Testing

Assessment:
Criterion 9 - Management assessment
Criterion 10 - Independent assessment

ISMS

Sandia is committed to performing work safely and ensuring the protection of members of the workforce, the public, and the environment. ISMS systematically integrates safety into management and work practices at all levels so that missions are accomplished while protecting the worker, the public, and the environment. The Environmental Management System (EMS) is integrated within ISMS as a component of environmental performance and assurances within ISMS. See Section 3.1 for additional information.

The ISMS five safety management functions incorporate Environment, Safety, and Health (ES&H) into all activities from planning through performance through continuous improvement. (See illustration on following page.)

ISMS Five Safety Management Functions

Plan work - which involves translating the mission into work, setting expectations, and prioritizing tasks and allocating resources.

Analyze Hazards - identify and analyze hazards associated with the work.

Control Hazards - develop and implement hazard controls, which involves identifying applicable requirements, identifying controls to prevent/mitigate hazards, establishing the safety envelope, and implementing controls.

Perform Work - perform work within controls, which involves confirming operational readiness and performing work safely.

Feedback and Improve - provide feedback on adequacy of controls and continue to improve safety management, which involves gathering feedback information on the adequacy of controls, identifying and implementing opportunities for improving the definition and planning of work, conducting line and independent oversight, and, if necessary, addressing regulatory enforcement actions.

8.2 ENVIRONMENTAL PROGRAM QA

Environmental Sampling

Environmental samples are collected by personnel in various programs and analyzed for radiological and non-radiological contaminants. Some sampling is specifically mandated by regulations to meet compliance while other sampling activities, which are not regulatory driven, are carried out in accordance with DOE Orders.

Samples are packaged, shipped, and tracked to off-site laboratories by the Sample Management Office (SMO) as discussed in Section 8.3. Some samples are processed and analyzed for radiological constituents by the SNL/NM Radiation Protection Sample Diagnostics (RPSD) laboratory in accordance with RPSD procedures.

8.3 ENVIRONMENTAL SAMPLING AND ANALYSIS

Environmental Sampling

Environmental sampling is conducted in accordance with program-specific sampling and analysis plans (SAPs) or work plans, each of which contains applicable QA elements. These documents meet appropriate federal, state, and local regulatory guidelines for conducting sampling and analysis activities.

SMO Roles and Responsibilities

The SMO provides guidance and sample management support for field activities. However, each distinct program is responsible for its overall adherence and compliance regarding any sampling and analysis activity performed.

The SMO is responsible for QA and Quality Control (QC) once the samples are relinquished to the SMO by field team members.

Program-Specific SAPs

Each program involved in environmental monitoring and sampling develops and follows a relevant SAP. Most project SAPs include the following critical elements: procedures for sample collection, sample preservation and handling, sample control, references to analytical methods and procedures, field and laboratory QC, health and safety, and schedules and frequency of sampling and reporting.

Selection of a Contract Laboratory

All off-site contract laboratories are selected based on performance objectives and appraisal (pre-award audit) as described in the Quality Assurance Project Plan (QAPP) for the SMO (SNL 2003b). All laboratories must employ EPA test procedures wherever possible; if not available, other suitable and validated test procedures are used. Laboratory instruments must be calibrated in accordance with established procedures, methods, and the SMO Statement of Work (SOW). All calibrations and detection limits must be verified before sample analysis and data reporting. Once a laboratory has passed the initial appraisal and has been awarded a contract, the SMO is responsible to ensure laboratories are audited annually and meet contractual requirements.

Contract laboratories are required to participate in applicable DOE and EPA programs for blind-audit check sampling to monitor the overall accuracy of analyses routinely performed on SNL/NM samples.

Project QC

Project specified QC samples are submitted to contract laboratories in order to meet project Data Quality Objectives (DQOs) and SAP requirements. Various field QC samples are collected to assess the quality and final usability of the data. Errors that can be introduced into the sampling process include potential sample contamination in the field or during transportation of samples, some of which are unavoidable. Additionally, the variability present at each sample location can also affect sample results.

Laboratory QC

With each SNL/NM sample batch, laboratory QC samples are concurrently prepared at defined frequencies and analyzed in accordance with established methods. Analytical accuracy, precision, contamination, and matrix effects associated with each analytical measurement are determined.

QC sample results are compared to either statistically established control criteria or method prescribed control limits for acceptance. Analytical results generated concurrently with QC sample results within established limits are considered acceptable. If QC analytical results exceed control limits, the results are qualified and corrective action is initiated if warranted. Reanalysis is then performed for samples in the analytical batch as specified in the SOW and laboratory procedures.

QC sample data results are included in analytical reports prepared by contract laboratories for SNL/NM.

8.4 2005 SMO ACTIVITIES

In 2005, the SMO processed a total of 10,433 samples in support of Sandia Corporation projects, including environmental monitoring (air and water), waste characterization, decontamination and demolition (D&D), and Environmental Restoration (ER). Of these, 3,690 were for environmental monitoring and surveillance projects. A total of 1,453 samples were submitted as field and analytical QC samples to assist with data validation and decision-making. Approximately 641 QC samples were for environmental monitoring and surveillance projects.

SMO Sample Processing

The SMO processed the following types of samples in 2005 in support of SNL/NM projects:

- *Radioactive waste*
- *Mixed waste*
- *Hazardous waste*
- *D&D*
- *D&D swipes*
- *D&D materials*
- *Underground Storage Tank (UST)*
- *Sludges and liquids*
- *Soil*
- *Groundwater*
- *Decon water*
- *Solid waste*
- *Air*
- *Wastewater effluent*
- *Surface water*
- *Storm water*
- *Soil gas*
- *Air filters*

SMO contract laboratories perform work in compliance with the Sandia Corporation SOW for analytical laboratories (Puissant 2003).

Inter-Laboratory Comparisons

SMO contract laboratories are required to participate in the DOE Assessment Programs including the Mixed Analyte Performance Evaluation Program (MAPEP) and the inter-laboratory QAP. They also participate in the NELAC performance testing program with a similar scope as the privatized EPA Water Pollution and Water Supply studies. SMO contract laboratories have a history of achieving a 90 percent or greater success rate during these comparisons. Acceptable results are based on either established control limits as stated in the applicable methods or statistically applied acceptance windows as determined by the Performance Evaluation Provider. Windows are typically two or three standard deviations around the true value.

Laboratory QA

In 2005, the SMO continued on-site data package assessments and validation at the NELAC approved laboratories used by Sandia Corporation. Data

packages (including a wide array of analysis methods) are requested at the time on the on-site visit; the laboratories are not notified in advance and do not know which data packages will be assessed. The handling history of the data package is carefully reviewed from sample receipt to data completion by retracing each step through documentation files. Specific checks for documentation completeness, proper equipment calibration, and batch QC data are made. These assessments focus on data defensibility and regulatory compliance.

During 2005, Sandia Corporation employed the following contract laboratories to perform analysis of SNL/NM samples:

General Engineering Laboratories (GEL) – Charleston, South Carolina.

Severn Trent – St. Louis, Missouri; Santa Ana, California; Austin, Texas; and Arvada, Colorado.

Hall Laboratory – Albuquerque, New Mexico.

QA Audits

The DOE Consolidated Audit Program (DOECAP), conducted audits in 2005 at the primary SMO contract laboratories using the DOECAP Quality Systems Analytical Services (QSAS) requirements. The audit reports, responses from the labs, and closure letters are all posted and tracked through the DOECAP website. The SMO works closely with the contract laboratories to expeditiously resolve audit findings. Decisions regarding sample distribution to the contract laboratories are based on audit information including outstanding corrective actions. In 2005, no priority one findings that impacted SMO work were documented during laboratory audits. All corrective actions were expeditiously resolved.

Data Validation and Records Management

Sample collection, Analysis Request and Chain of Custody (ARCOC) documentation, and measurement data were reviewed and validated for each sample collected. Analytical data reported by the laboratories were reviewed to assess laboratory and field precision, accuracy, completeness, representativeness, and comparability with respect to method compliance and the DQOs of the particular program. Data were reviewed and validated at a minimum of three levels:

• By the analytical laboratory, where the data were validated according to the laboratory's QA plan, standard operating procedures, and client specific requirements;

• By a qualified member of Sandia Corporation's SMO staff, who reviewed the analytical reports and corresponding sample collection and ARCOC documentation for completeness and laboratory contract compliance; and

• By the Sandia Corporation Project Leader responsible for program objectives, regulatory compliance, and project-specific data quality requirements. The Project Leader makes the final decision regarding usability of data.

In addition, a predetermined percentage of data are validated to detailed method specified requirements and qualified in accordance with the Data Validation Procedure for Chemical and Radiochemical Data (SNL 2003).

This page intentionally left blank.

chapter nine

REFERENCES, DOCUMENTS, PERMITS, LAWS, REGULATIONS, AND STANDARDS FOR ENVIRONMENTAL PROGRAMS

In This Chapter ...

REFERENCES

ACGIH 2006 — *2006 TLVs and BEIs: Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.* American Conference of Government Industrial Hygienists, Cincinnati, OH (2006).

AED 2006 — Albuquerque Economic Development, Inc., website at < http://www.abq.org/ > Albuquerque, NM (2006).

Anderson 2004 — Anderson, E., *Results of Tritium Emission Flux Measurements for Sandia National Laboratories Mixed Waste Landfill.* Prepared by URS Corporation for Sandia National Laboratories Environmental Restoration Program, Austin, TX (February 2004).

Bearzi 2000 — Bearzi, J.P. (New Mexico Environment Department), Letter to M. Zamorski (U.S. Department of Energy) and R. Egan (Sandia Corporation), "Class 1 Permit Modification Approval and Notice of Administrative Completeness: Request for Chemical Waste Landfill Ground-Water Monitoring Schedule Change, Sandia National Laboratories NM5890110518, Task# HRMB-SNL-00-006" (May 5, 2000).

Bjorklund and Maxwell 1961 — Bjorklund, L. J. and Maxwell, B. W., *Availability of Groundwater in the Albuquerque Area, Bernalillo and Sandoval Counties, New Mexico.* New Mexico State Engineer Technical Report 21 (1961).

Brookins 1992 — Brookins, D., "Background Radiation in the Albuquerque, New Mexico, U.S.A., Area," in *Environmental Geology and Water Science,* Vol. 19, No. 1, pp. 11-15. (1992).

Dinwiddie 1998 — Dinwiddie, R.S. (New Mexico Environment Department), Letter to M.J. Zamorski (U.S. Department of Energy), "Request for Supplemental Information: Appendix G, Sampling and Analysis Plan for Ground Water Assessment at the Chemical Waste Landfill, Revision 5.0, April 1997" (March 31, 1998).

Dinwiddie 1997 — Dinwiddie, R.S. Request for Supplemental Information: Background Concentrations Report, SNL/KAFB, Letter from S. Dinwiddie, State of New Mexico Environment Department, Hazardous & Radioactive Materials Bureau, September 24, 1997, to Michael J. Zamorski, U.S. Department of Energy, Kirtland Area Office.

DOC 2006 — U.S. Department of Commerce, U.S. Census Bureau, website at <http://www.census.gov/> Washington, DC (2006).

DOE/NNSA 2005 — U.S. Department of Energy/National Nuclear Security Administration, *NNSA FY2005 Performance Evaluation Report of Sandia Corporation for the Management and Operation of Sandia National Laboratories.* U.S. Department of Energy/National Nuclear Security Administration, Sandia Site Office, Albuquerque, NM (December 8, 2005).

DOE/NNSA 2004 — U.S. Department of Energy, *DOE/NNSA Model Statement of Work,* Revision 6. U. S. Department of Energy, NNSA Service Center, Albuquerque, NM (2004).

DOE 2005 — DOE Order 450.1 (See DOE Orders Section)

DOE 2005a — DOE Order 414.1C (See DOE Orders Section)

DOE 2005b — DOE Order 151.1C (See DOE Orders Section)

DOE 2004 — DOE Order 231.1A (See DOE Orders Section)

DOE 2004a — DOE Manual 231.1-1A (See DOE Orders Section)

DOE 2003 — DOE Manual 231.1-2 (See DOE Orders Section)

DOE 2003a — DOE Notice 153.2 (See DOE Orders Section)

DOE 2002 — DOE Order 470.2B (See DOE Orders Section)

DOE 2002a U.S. Department of Energy, Title V Operating Permit Application #515 (2002 update; Volume 1 for Sandia National Laboratories). DOE/Sandia Site Office, Albuquerque, NM (2002).

DOE 2001 DOE Order 435.1 (See DOE Orders Section)

DOE 2001a DOE Order 451.1B (See DOE Orders Section)

DOE 2001b DOE Notice 450.7 (See DOE Orders Section)

DOE 2001c U.S. Department of Energy, *Environmental Assessment for the Proposed Sandia Underground Reactor Facility (SURF) in TA-V,* DOE/EA-1382. U.S. Department of Energy, Kirtland Area Office, Albuquerque, NM (November 2001).

DOE 2000 U.S. Department of Energy, *Environmental Assessment for the Microsystems and Engineering Sciences Application (MESA) Complex,* DOE/EA-1335. U.S. Department of Energy, Albuquerque, NM (2000).

DOE 1999 U.S. Department of Energy, *Environmental Assessment (EA) Rapid Reactivation Project,* DOE / EA-1264. DOE Kirtland Area Office, Albuquerque, NM (February 11, 1999).

DOE 1999a U.S. Department of Energy, *Sandia National Laboratories Final Site-Wide Environmental Impact Statement (SWEIS),* DOE/EIS-0281. DOE Albuquerque Operations Office, Albuquerque, NM (October 1999; ROD December 6, 1999).

DOE 1997 DOE Order 225.1A (See DOE Orders Section)

DOE 1997a DOE Policy 450.5 (See DOE Orders Section)

DOE 1996 U.S. Department of Energy, *Environmental Assessment of the Environmental Restoration Project at Sandia National Laboratories/New Mexico,* DOE EA-1140. DOE, Kirtland Area Office, Albuquerque, NM (FONSI issued March 25, 1996).

DOE 1995 U.S. Department of Energy, *Sandia National Laboratories: Program Implementation Plan for Albuquerque Potential Release Sites; p.1-2.* DOE, Albuquerque Operations Office, Albuquerque, NM (February 1995).

DOE 1993 DOE/AL Order 5400.2A (See DOE Orders Section)

DOE 1993a DOE Order 5400.5 (See DOE Orders Section)

DOE 1993b DOE Order 5480.4 (See DOE Orders Section)

DOE 1990 DOE Secretary of Energy Notice SEN-22-90 (See DOE Orders Section)

DOE 1987 U.S. Department of Energy/Albuquerque Operations Office (DOE/AL), *Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1: Installation Assessment,* draft. DOE/ Albuquerque Area Office, Environment, Safety and Health Division, Albuquerque, NM (September 1987).

DOE/SNL 2001 U.S. Department of Energy/Sandia National Laboratories, *Environmental Restoration Project Long-Term Environmental Stewardship (LTES) Plan* (draft). DOE/Albuquerque Operations Office and Sandia National Laboratories, Albuquerque, NM (October 2001-Chapter 6 updated 2003).

Dragun and Chekiri 2005 Dragun, J. and K. Chekiri, *Elements in North American Soils.* The Association for Environmental Health and Sciences, Amherst, MA (2005).

EPA 2005 U.S. Environmental Protection Agency, *Radiation Risk Assessment Software (CAP88-PC)*, Version 3.0. Available on the EPA web site at < http://www.epa.gov/radiation/assessment/CAP88/index.html>.

EPA 2002 U.S. Environmental Protection Agency Region VI, *Risk-Based Approval Request Under 40 CFR 761.61(c)*, issued June 26, 2002.

EPA 2001 — U.S. Environmental Protection Agency, *Multi-Sector General Storm Water Permit*, Permit Number NMR05A961. U.S. Environmental Protection Agency, Washington, DC (2001).

EPA 1997 — U.S. Environmental Protection Agency (EPA) Region VI, September 1997, Section U, *Corrective Action Management Unit, of Module IV, Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA, of the Resource Conservation and Recovery Act Permit for Sandia National Laboratories*, EPA ID Number NM5890110518, issued September 25, 1997.

EPA 1986 — U.S. Environmental Protection Agency, *Guidelines on the Identification and Use of Air Quality Data Affected by Exceptional Events*, EPA/450-4-86-007. U.S. Environmental Protection Agency, Research Triangle Park, NC (1986).

EPA 1985 — U.S. Environmental Protection Agency, "Hazardous Waste Management System; Final Codification Rule." *Federal Register*, 50 FR 28702, (p. 28712) (July 15, 1985).

Gonzales, L 2004 — Gonzales, L., *ES&H and Emergency Management Quality Assurance Plan (QAP)*, PLA 02-01, Revision 2. Sandia National Laboratories, Albuquerque, NM (February 9, 2004).

Gore 1993 — Gore, A., *From Red Tape to Results: Creating a Government that Works Better and Costs Less* (Report of the National Performance Review). U.S. Government Printing Office, Washington, DC (1993).

Grant 1982 — Grant, P.R., Jr., "Geothermal Potential in the Albuquerque Area, New Mexico," in *Guidebook- New Mexico Geological Society*, Volume 33, pp. 325-331 (1982). New Mexico Geological Society, Albuquerque, NM (1982).

IT Corp 1994 — IT Corp, *Background Concentrations of Constituents of Concern to the Sandia National Laboratories/ New Mexico, Environmental Restoration Project*, (1994).

Kabata-Pendias 2000 — Kabata-Pendias, A., *Trace Elements in Soils and Plants*, 3rd. Ed. CRC Press, Inc., Boca Raton, FL (2000).

Kelley 1977 — Kelley, V. C., *Geology of Albuquerque Basin, New Mexico*, Memoir 33. New Mexico Bureau of Mines and Mineral Resources, Socorro, NM (1977).

Kelley and Northrup 1975 — Kelley, V. C., and S. A. Northrup, *Geology of Sandia Mountains and Vicinity, New Mexico*, Memoir 29. New Mexico Bureau of Mines and Mineral Resources, Socorro, NM (1975).

Kieling, J.E. 2003 — Kieling, J.E., Letter to K.L. Boardman (U.S. Department of Energy) and P.B. Davies (Sandia Corporation), "Chemical Waste Landfill, Corrective Measures Study, May 2003, Sandia National Laboratories NM5890110518, HWB-SNL-03-013." December 12, 2003.

Lozinsky et al. 1991 — Lozinsky, R., and R.H. Tedford, *Geology and Paleontology of the Santa Fe Group, Southwestern Albuquerque Basin, Valencia County, New Mexico*. New Mexico Bureau of Mines and Mineral Resources, New Mexico Institute of Mining and Technology, Socorro, NM (1991).

Machette et al. 1982 — Machette, M., C. Wentworth, and J. Nakata, *Quaternary Fault Map of the Basin and Range and the Rio Grande Rift Provinces, Western United States*, in Open File Report 82-579. U.S. Geological Survey, Denver, CO (1982).

Nieto 2004 — Nieto, D., *Terrestrial Surveillance Program*, FOP 95-03, Revision 5. Sandia National Laboratories, Albuquerque, NM (2004).

NMDOA 2006 — New Mexico Department of Agriculture website at <http://nmdaweb.nmsu.edu/> (2006).

NMED 2005 — New Mexico Environment Department (NMED), *Technical Background Document for Development of Soil Screening Levels,* Revision 3. NMED/Hazardous Waste Bureau, Ground Water Quality Bureau, and Voluntary Remediation Program, Santa Fe, NM (2005).

NMED 2004 — New Mexico Environment Department (NMED), Federal Facilities Compliance Order (Sandia National Laboratories, New Mexico), as amended by NMED, Santa Fe, NM (Amendment No. 4 dated April 7, 2004).

NMGS 1984 New Mexico Geological Society, "Rio Grande Rift, Northern New Mexico" in *35th Annual Field Conference, October 11-13, 1984*. Editors: W. Baldridge, P. Dickerson, R. Riecker, and J. Zidek. New Mexico Geological Society, Socorro, NM (October 1984).

NNSA 2006 National Nuclear Security Administration*, Fiscal Year 2006, Performance Evaluation Plan (PEP) for Sandia Corporation in the Operation and Management of Sandia National Laboratories*. (Revision 3) Sandia National Laboratories, Albuquerque, NM (2006).

NOAA 2006 National Oceanic and Atmospheric Administration, *Local Climatological Data, Annual Summary with Comparative Data, Albuquerque, New Mexico for 2004*. NOAA, National Climatic Data Center, Asheville, NC (2006).

Peace, Goering, and McVey 2002 Peace, J.L., T.J. Goering, and M.A. McVey, *Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, Sandia National Laboratories, Albuquerque, New Mexico*, SAND 2002-2997. Sandia National Laboratories, Albuquerque, NM (2002).

Puissant 2003 Puissant, P., *Statement of Work for Analytical Laboratories, Sandia National Laboratories/New Mexico (SNL/NM)*, Revision 2. Sandia National Laboratories, Albuquerque, NM (March 2003).

Shyr, Herrera, Haaker 1998 Shyr, L., H. Herrera, R. Haaker, *The Role of Data Analysis in Sampling Design of Environmental Monitoring*, SAND98-0612. Sandia National Laboratories, Albuquerque, NM (March 1998).

SNL 2006 Sandia National Laboratories, Section 17B- "Air Permits" from Chapter 17, "Air Emissions," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (March 6, 2006).

SNL 2006a Sandia National Laboratories, *Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993-2005.* SAND2006-1468, Sandia National Laboratories, Albuquerque, NM (March 2006).

SNL 2006b Sandia National Laboratories, *Corporate Quality Assurance Program*, CPR001.3.2. Sandia National Laboratories, Albuquerque, NM (February 20, 2006).

SNL 2006c Sandia National Laboratories, *2005 Data Analysis in Support of the Annual Site Environmental Report*. Sandia National Laboratories, Albuquerque, NM (2006).

SNL 2006d Sandia National Laboratories, *ES&H Manual*, MN471001, CPR 400.1.1, Issue FJ. Sandia National Laboratories, Albuquerque, NM (February 14, 2006).

SNL 2006e Sandia National Laboratories, *Integrated Safety Management System (ISMS) Description,* CPR 400.1.2 Sandia National Laboratories, Albuquerque, NM (2006).

SNL 2006f Sandia National Laboratories, *NESHAP Annual Report for CY05, Sandia National Laboratories, New Mexico,* Sandia National Laboratories, Albuquerque, NM (2006).

SNL 2006g Sandia National Laboratories, Section 19F- "Other Waste," from Chapter 19, "Waste Management," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (May 8, 2006).

SNL 2006h Sandia National Laboratories, *Radiological Dose Calculations and Supplemental Dose Assessment Data for NESHAP Compliance, Sandia National Laboratories, NM, 2005*. Sandia National Laboratories, Albuquerque, NM (June 2006).

SNL 2006i Sandia National Laboratories, Section 6D- "Hazard Communication Standard" from Chapter 6, "Industrial Hygiene," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (January 9, 2006).

SNL 2006j Sandia National Laboratories, Section 6S- "Toxic Substances Control Act (TSCA)" from Chapter 6, "Industrial Hygiene," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (March 8, 2006).

SNL 2006k Sandia National Laboratories, Section 10B "National Environmental Policy Act (NEPA), Cultural Resources, and Historic Properties," from Chapter 10, "Environmental Protection," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (March 1, 2006).

SNL 2006l Sandia National Laboratories, Section 10F "Oil and Fuel Storage," from Chapter 10, "Environmental Protection," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (April 3, 2006).

SNL 2006m Sandia National Laboratories, *The National Environmental Policy Act (NEPA), Cultural Resources and Historic Properties Programs*, PG470110, Issue F. Sandia National Laboratories, Albuquerque, NM (January 3, 2006).

SNL 2005 Sandia National Laboratories, *SNL/NM Air Quality and NEPA Quality Assurance Program Plan,* QAP 02-04. Sandia National Laboratories, Albuquerque, NM (May 2005).

SNL 2005a Sandia National Laboratories, *Chemical Waste Landfill Quarterly Closure Progress Report, January-March 2005.* Sandia National Laboratories, Albuquerque, NM (2005).

SNL 2005b Sandia National Laboratories, *Chemical Waste Landfill Quarterly Closure Progress Report, April-June 2005.* Sandia National Laboratories, Albuquerque, NM (2005).

SNL 2005c Sandia National Laboratories, *Chemical Waste Landfill Quarterly Closure Progress Report, July-September 2005.* Sandia National Laboratories, Albuquerque, NM (2005).

SNL 2005d Sandia National Laboratories, *Chemical Waste Landfill Quarterly Closure Progress Report, October-December 2005.* Sandia National Laboratories, Albuquerque, NM (2005).

SNL 2005e Sandia National Laboratories, *Comprehensive Part B Permit Request.* Sandia National Laboratories, Albuquerque, NM (October 2005).

SNL 2005f Sandia National Laboratories, *Environmental Management Operating Plan*. PG470224. Sandia National Laboratories, Albuquerque, NM (January 2005).

SNL 2005g Sandia National Laboratories, Section 6K- "Hazardous Waste Operations and Emergency Response (HAZWOPER)" from Chapter 6, "Industrial Hygiene," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (November 16, 2005).

SNL 2005h Sandia National Laboratories, *Integrated Laboratory Management System (ILMS)*, CPSR001.3. Sandia National Laboratories, Albuquerque, NM (September 30, 2005).

SNL 2005i Sandia National Laboratories, *NPDES Discharge Monitoring Report for 2004*. Sandia National Laboratories, Albuquerque, NM (2005).

SNL 2005j Sandia National Laboratories, *Programmatic Waste Acceptance Criteria*, POL 95-01, Revision 5. Sandia National Laboratories, Albuquerque, NM (September 5, 2005).

SNL 2005k Sandia National Laboratories, Section 19B "Radioactive Waste Management," from Chapter 19, "Waste Management," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (January 21, 2005).

SNL 2005l Sandia National Laboratories, *Site Treatment Plan for Mixed Waste, FY04 Update.* Sandia National Laboratories, Albuquerque, NM (March 2005).

SNL 2005m Sandia National Laboratories, *Site Treatment Plan for Mixed Waste, Sandia National Laboratories/ New Mexico, Revision 9*. (This contains a Compliance Plan Volume [CPV] and a Background Volume [BV]). Sandia National Laboratories, Albuquerque, NM (Approved by the New Mexico Environment Department June 2005).

SNL 2005o Sandia National Laboratories, memo for file, "Summary of the KAFB Skeet Range and Residual Lead (Pb) Shot at Sandia National Laboratories Terrestrial Surveillance Location #20," Sandia National Laboratories, Albuquerque, NM (2005).

SNL 2005n Sandia National Laboratories, *Corrective Action Management Unit (CAMU) Vadose Zone Monitoring System (VZMS) Annual Monitoring Results Report*. Sandia National Laboratories, Albuquerque, NM (September 2005).

SNL 2004 Sandia National Laboratories, *Manzano Nuclear Facilities Non-Nuclear Storage Bunkers Maintenance Support Program*, PRG 98-01, Revision 4. Sandia National Laboratories, Albuquerque, NM (September 19, 2004).

SNL 2004a Sandia National Laboratories, *Ozone-Depleting Substances Management Program*, *Oversight Administrative Operating Procedure* (AOP 97-04, Revision 02). Sandia National Laboratories, Albuquerque, NM (August 9, 2004).

SNL 2004b Sandia Nationals Laboratories, *Quality Assurance Project Plan (QAPP) for the Preparation of Environmental Assessments at Sandia National Laboratories, NM*, QAP 99-02, Revision 1. Sandia National Laboratories, Albuquerque, NM (May 2004).

SNL 2004c Sandia National Laboratories, *Quality Assurance Project Plan for Terrestrial Surveillance at SNL/NM*, QUA 94-04, Rev 3. Sandia National Laboratories, Albuquerque, NM (April 15, 2004).

SNL 2004d Sandia National Laboratories, Section 10T "Surface and Storm Water Discharges" from Chapter 10, "Environmental Protection," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (January 26, 2004).

SNL 2004e Sandia National Laboratories, Section 18C "Occurrence Reporting," from Chapter 18, "Reporting, Investigating, and Correcting ES&H Events," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (September 23, 2004).

SNL 2004f Sandia National Laboratories, Section 19A "Hazardous Waste Management," from Chapter 19, "Waste Management," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (September 29, 2004).

SNL 2004g Sandia National Laboratories, Section 19C "Mixed Waste Management," from Chapter 19, "Waste Management," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (November 8, 2004).

SNL 2004h Sandia National Laboratories, *SNL/NM Wastewater Sampling and Analysis (SAP) and Quality Assurance/Quality Control (QA/QC) Plan*, PLA 04-02, Sandia National Laboratories, Albuquerque, NM (January 2004).

SNL 2004i Sandia National Laboratories, *Waste Characterization Project Overview*, PRG 98-02, Revision 6. Sandia National Laboratories, Albuquerque, NM (May 20, 2004).

SNL 2004j Sandia National Laboratories, *2003 Hazardous Waste Biennial Report for Sandia National Laboratories/New Mexico and Sandia National Laboratories/Tonopah Test Range*, Sandia National Laboratories, Albuquerque, NM (March 2004).

SNL 2003 Sandia National Laboratories, *Data Validation Procedure for Chemical and Radiochemical Data*, AOP 00-03, Revision 01. Environmental Restoration Project, Sandia National Laboratories, Albuquerque, NM (2003).

SNL 2003a Sandia National Laboratories, *Final Spill Prevention Controls and Countermeasures (SPCC) Plan at Sandia National Laboratories/New Mexico*, PLA 90-11 Rev. 6. Sandia National Laboratories, Albuquerque, NM (June 2003).

SNL 2003b Sandia National Laboratories, *Quality Assurance Project Plan (QAPP) for the Sample Management Office (SMO)*, Rev. 0. Sandia National Laboratories, Albuquerque, NM (December 2003).

SNL 2003c Sandia National Laboratories, *Quality Assurance Project Plan (QAPP) Meteorological and Ambient Air Monitoring Program*, QUA-94-03, Rev. 2. Sandia National Laboratories, Albuquerque, NM (2003).

SNL 2003d Sandia National Laboratories, *Radioactive Waste/Nuclear Material Disposition Department (RWNMDD) Waste Management Program, PRG 95-01,* Revision 4. Sandia National Laboratories, Albuquerque, NM (September 30, 2003).

SNL 2003e Sandia National Laboratories, *Sampling and Analysis Plan for the Storm Water Monitoring Program,* Plan 91-16, Rev. 4. Sandia National Laboratories, Albuquerque, NM (October 1, 2003).

SNL 2003f Sandia National Laboratories, Section 10H- "Discharges to the Sanitary Sewer System" from Chapter 10, "Environmental Protection," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (August 5, 2003).

SNL 2003g Sandia National Laboratories, Section 10K- "Underground Storage Tanks," from Chapter 10, "Environmental Protection," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (June 10, 2003).

SNL 2003h Sandia National Laboratories, Section 19D- "Radioactive Material Management Areas (RMMAs)," from Chapter 19, "Waste Management," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (August 5, 2003).

SNL 2003i Sandia National Laboratories, *Waste Management*, PG 470185. Sandia National Laboratories, Albuquerque, NM (March 2003).

SNL 2003j Sandia National Laboratories, *Resource Conservation and Recovery Act Closure for the Corrective Action Management Unit, Technical Area III, Sandia National Laboratories/New Mexico Environmental Restoration Project,* Sandia National Laboratories, Albuquerque, NM (December 2003).

SNL 2002 Sandia National Laboratories, *Radiological NESHAP Quality Assurance Project Plan (QAPjP),* QAP98-01 Rev. 2. Sandia National Laboratories, Albuquerque, NM (September 2002).

SNL 2002a Sandia National Laboratories, *SWEIS Annual Review: FY2001*, SAND2002-3914. Sandia National Laboratories, Albuquerque, NM (2002).

SNL 2002b Sandia National Laboratories, *Class II Permit Modification Request for Temporary Unit Treatment Operations at the Corrective Action Management Unit, Technical Area III*, Revision 2. Sandia National Laboratories, Albuquerque, NM (May 2002).

SNL 2002c Sandia National Laboratories, *Closure Plan for the Corrective Action Management Unit, Technical Area III, Sandia National Laboratories/New Mexico, Environmental Restoration Project,* Sandia National Laboratories, Albuquerque, NM (October 2002).

SNL 2001 Sandia National Laboratories, Risk-Based Approval Request, 40 CFR 761.61(c) *Risk-Based Method for Management of PCB Materials, Sandia National Laboratories/New Mexico, Chemical Waste Landfill Remediation and Corrective Action Management Unit.* Sandia National Laboratories, Albuquerque, NM (October 2001).

SNL 2001a Sandia National Laboratories, Section 10E "Chemical Spills" from Chapter 10, "Environmental Protection," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (October 25, 2001).

SNL 2001b Sandia National Laboratories, *Storm Water Pollution Prevention Plan (SWP3)*, PLA97-06, Rev. 2. Sandia National Laboratories, Albuquerque, NM (November 2001).

SNL 2001c Sandia National Laboratories (with DOE), *Discharge Plan Renewal Application, DP-530, SNL/NM*. Sandia National Laboratories, Albuquerque, NM (Renewed 9/21/2001, expires 9/21/2006).

SNL 2001d Sandia National Laboratories, *SWEIS Annual Review: FY2000*, SAND2001-2526. Sandia National Laboratories, Albuquerque, NM (2001).

SNL 2001e Sandia National Laboratories, *Fiscal Year 2000 Update: Facilities and Safety Information Document and Environmental Information Document*, SAND2000-2705. Sandia National Laboratories, Albuquerque, NM (2001).

SNL 2000 Sandia National Laboratories, *Environmental Assessment for Land-Use Modifications to Support the SNL/NM Model Validation and System Certification Test Center in TA-III*, AF-00-006 (prepared by Sandia National Laboratories and submitted by the DOE to the U.S. Air Force), Sandia National Laboratories, Albuquerque, NM (2000).

SNL 2000a — Sandia National Laboratories, *Environmental Assessment for a 5-Year Permit Request for Two-Way Roadway West of Building 894 for Service/Emergency Access*, PERM/O-Ki-99-0001, AF-00-018 (prepared by Sandia National Laboratories and submitted by the DOE to the U.S. Air Force). Sandia National Laboratories, Albuquerque, NM (2000).

SNL 1999 — Sandia National Laboratories, Section 17C- "Air Emissions Control Measures," from Chapter 17, "Air Emissions," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (January 28, 1999).

SNL 1999a — Sandia National Laboratories, Section 17D- "Ozone Depleting Substances," from Chapter 17, "Air Emissions," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (May 4, 1999).

SNL 1998 — Sandia National Laboratories, *Site-Wide Hydrogeologic Characterization Project, Annual Report, Calendar Year 1995 (Revised 1998)*. Sandia National Laboratories, Albuquerque, NM (February 1998).

SNL 1997 — Sandia National Laboratories, Section 19E -"Treatability Studies for Hazardous and Mixed Waste," from Chapter 19, "Waste Management," of the *ES&H Manual*, MN471001. Sandia National Laboratories, Albuquerque, NM (October 6, 1997).

SNL 1997a — Sandia National Laboratories, *Water Quality*, PG 470187, Issue B. Sandia National Laboratories, Albuquerque, NM (November 1997).

SNL 1997b — Sandia National Laboratories, *Final Class III Permit Modification Request for the Management of Hazardous Remediation Wastes in the Corrective Action Management Unit, Technical Area III, Sandia National Laboratories/New Mexico Environmental Restoration Project,* Sandia National Laboratories, Albuquerque, NM (September 1997).

SNL 1992 — Sandia National Laboratories, *Chemical Waste Landfill Final Closure Plan and Postclosure Permit Application*. Sandia National Laboratories, Albuquerque, NM (December 1992).

SNL/Outrider Corporation 2006 — Sandia National Laboratories/Outrider, *Chemical Inventory Report, Calendar Year 2005*. Sandia National Laboratories/Outrider, Albuquerque, NM (June 2006).

Thorn et al. 1993 — Thorn, C.R., D. P. McAda, and J.M. Kernodle, *Geohydrologic Framework and Hydrologic Conditions in the Albuquerque Basin, Central New Mexico*, Water Resources Investigation Report 93-4149. U.S. Geological Survey, Albuquerque, NM (1993).

USACE 1979 — U.S. Army Corps of Engineers, *Special Flood Hazard Information, Tijeras Arroyo and Arroyo del Coyote, Kirtland AFB, New Mexico.* U.S. Army Corps of Engineers Albuquerque District, Albuquerque, NM (1979).

USAF 2001 — U.S. Air Force, *RCRA Document Submittal No Further Action for Corrective Action Units OT-86 and SS-83, Former Small Arms Range (OT-86) and Skeet Range and Landfill Road (SS-83) U.S. Air Force* Albuquerque, NM (2001).

Wood and Kienle 1990 — Wood, C.A., and J. Kienle (editors), *Volcanoes of North America: United States and Canada* Cambridge University Press, Cambridge, England (1990).

Woodward 1982 — Woodward, L. A., "Tectonic Framework of Albuquerque Country," in *Albuquerque Country II, Guidebook - 33rd New Mexico Geological Society Field Conference*. New Mexico Geological Society, Albuquerque, NM (1982).

EXECUTIVE ORDERS

EO 11988 *Floodplain Management,* as amended (May 24, 1977)

EO 11990 *Protection of Wetlands,* as amended (May 24, 1977)

EO 12898 *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations,* as amended (February 11, 1994)

EO 13101 *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition* (September 14, 1998)

EO 13123 *Greening the Government Through Efficient Energy Management* (June 3, 1999)

EO 13148 *Greening the Government Through Leadership in Environmental Management* (April 21, 2000)

EO 13149 *Greening the Government Through Federal Fleet and Transportation Efficiency* (April 21, 2000)

DOE ORDERS

DOE 2005 U.S. Department of Energy, *Environmental Protection Program,* DOE Order 450.1, Change 1. U.S. Department of Energy, Washington, DC (12/7/2005).

DOE 2005a U.S. Department of Energy, *Quality Assurance*, DOE Order 414.1C. U.S. Department of Energy, Washington, DC (6/17/2005).

DOE 2005b U.S. Department of Energy, *Comprehensive Emergency Management System*, DOE Orders 151.1B and 151.1C. U.S. Department of Energy, Washington, DC (11/2/2005).

DOE 2004 U.S. Department of Energy, *Environment, Safety, and Health Reporting*, DOE Order 231.1A, Change 1. U.S. Department of Energy, Washington, DC (6/3/2004).

DOE 2004a U.S. Department of Energy, *Environment, Safety, and Health Reporting Manual*, DOE Manual 231.1-1A, Change 1. U.S. Department of Energy, Washington, DC (9/9/2004).

DOE 2003 U.S. Department of Energy, *Occurrence Reporting and Processing of Operations Information,* DOE Manual 231.1-2. U.S. Department of Energy, Washington, DC (8/19/2003).

DOE 2003a U.S. Department of Energy, *Connectivity to National Atmospheric Release Advisory Center (NARAC)*, DOE Notice 153.2. U.S. Department of Energy, Washington, D.C. (8/11/2003).

DOE 2002 U.S. Department of Energy, *Independent Oversight and Performance Assurance Program*, DOE Order 470.2B. U.S. Department of Energy, Washington, DC (10/31/2002).

DOE 2001 U.S. Department of Energy, *Radioactive Waste Management*, DOE Order 435.1, Change 1. U.S. Department of Energy, Washington, DC (8/28/2001).

DOE 2001a U.S. Department of Energy, *National Environmental Policy Act Compliance Program*, DOE Order 451.1B, Change 1. U.S. Department of Energy, Washington, DC (9/28/2001).

DOE 2001b U.S. Department of Energy, *The Safe Handling, Transfer, and Receipt of Biological Etiologic Agents at Department of Energy Facilities,* DOE N 450.7. U.S. Department of Energy, Washington, DC (10/17/2001).

DOE 1997 U.S. Department of Energy, *Accident Investigations,* DOE Order 225.1A. U.S. Department of Energy, Washington, DC. U.S. Department of Energy, Washington, DC (11/26/1997).

DOE 1997a U.S. Department of Energy, *Line Environment, Safety and Health Oversight,* DOE Policy 450.5. U.S. Department of Energy, Washington, D.C. (6/26/1997).

DOE 1993 U.S. Department of Energy, *Environmental Compliance Issue Coordination*, DOE/AL Order 5400.2A. U.S. Department of Energy, Albuquerque Field Office, Albuquerque, NM (7/13/1993).

DOE 1993a U.S. Department of Energy, *Radiation Protection of the Public and the Environment*, DOE Order 5400.5, Change 2. U.S. Department of Energy, Washington, DC (1/7/1993).

DOE 1993b U.S. Department of Energy, *Environmental Protection, Safety, and Health Protection Standards,* DOE Order 5480.4, Change 4. U.S. Department of Energy, Washington, D.C. (1/7/1993).

DOE 1990 U.S. Department of Energy, "DOE Policy on Signatures of RCRA Permit Applications," SEN-22-90. U.S. Department of Energy, Washington, DC (5/8/1990).

CODE OF FEDERAL REGULATIONS

10 CFR 20 "Standards for Protection Against Radiation" (addresses radiological levels in wastewater)

10 CFR 835 "Occupational Radiation Protection" (Implements Price Anderson Act)

10 CFR 1021 "National Environmental Policy Act Implementing Procedures"

36 CFR 60 National Register of Historic Places.

36 CFR 800 Protection of Historic Properties.

40 CFR 50 "National Primary and Secondary Ambient Air Quality Standards"

40 CFR 51 "Requirements for Preparation, Adoption, and Submittal of Implementation Plans

40 CFR 58 "Ambient Air Quality Surveillance"

40 CFR 61 "National Emission Standards for Hazardous Air Pollutants (NESHAP)." Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities"

40 CFR 68 "Chemical Accident Prevention Provisions"

40 CFR 110 "Discharge of Oil"

40 CFR 112 "Oil Pollution Prevention"

40 CFR 122-125 (National Pollutant Discharge Elimination System [NPDES] Regulations)

40 CFR 122 "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System" (NPDES)

40 CFR 123 "State Program Requirements" (NPDES)

40 CFR 124 "Procedures for Decisionmaking"

40 CFR 125 "Criteria and Standards for the National Pollutant Discharge Elimination System (NPDES)"

40 CFR 136 "Guidelines Establishing Test Procedures for the Analysis of Pollutants"

40 CFR 141 "National Primary Drinking Water Regulations"

40 CFR 141.26	"Monitoring Frequency and Compliance Requirements for Radionuclides in Community Water Systems"
40 CFR 143	"National Secondary Drinking Water Regulations"
40 CFR 260-279	RCRA regulations for hazardous waste (as it pertains to mixed waste)
40 CFR 260	"Hazardous Waste Management System: General"
40 CFR 261	"Identification and Listing of Hazardous Waste" (20.4.1.200 NMAC)
40 CFR 262	"Standards Applicable to Generators of Hazardous Waste" (20.4.1.300 NMAC)
40 CFR 263	"Standards Applicable to Transporters of Hazardous Waste" (20.4.1.400 NMAC)
40 CFR 264	"Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities" including Subpart F, "Releases from Solid Waste Management Units" and Section 264.101, " Corrective Action for Solid Waste Management Units" (20.4.1.500 NMAC)
40 CFR 265	"Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities" including Subpart F, "Groundwater Monitoring" (20.4.1.600 NMAC)
40 CFR 266	"Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities" (20.4.1.700 NMAC)
40 CFR 268	"Land Disposal Restrictions" (20.4.1.800 NMAC)
40 CFR 270	"EPA Administered Permit Programs: The Hazardous Waste Permit Program" (20.4.1.900 NMAC)
40 CFR 271	"Requirements for Authorization of State Hazardous Waste Programs"
40 CFR 272	"Approved State Hazardous Waste Management Programs"
40 CFR 279	"Standards for the Management of Used Oil"
40 CFR 280	"Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks"
40 CFR 281	"Approval of State Underground Storage Tank Programs"
40 CFR 300	"National Oil and Hazardous Substances Pollution Contingency Plan" (NCP)
40 CFR 302	"Designation, Reportable Quantities, and Notification" (CERCLA Implementing Regulation)
40 CFR 355	"Emergency Planning and Notification"
40 CFR 370	"Hazardous Chemical Reporting: Community Right-to-Know"
40 CFR 372	"Toxic Chemical Release Reporting: Community Right-to-Know" (EPCRA Implementing Regulation)
40 CFR 403	"General Pretreatment Regulations for Existing and New Sources of Pollution"
40 CFR 761	"Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions"
40 CFR 763	"Asbestos"

40 CFR 1500-1508 Council on Environmental Quality, Executive Office of the President, Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act.

49 CFR 100-199 (Department of Transportation requirements)

49 CFR 171–180 (Department of Transportation regulations for hazardous and radioactive waste shipments)

ACTS AND STATUTES

- American Indian Religious Freedom Act (AIRFA) of 1978 (42 U.S.C. §1996)
- Archaeological Resources Protection Act (ARPA) of 1979 (16 U.S.C. §470aa)
- Atomic Energy Act (AEA) of 1954 (42 U.S.C. §2011 et seq.)
- Clean Air Act (CAA) and CAA Amendments (CAAA) of 1990 (42 U.S.C. §7401)
- Clean Water Act (CWA) of 1977 (the Federal Water Pollution Control Act) (33 U.S.C. §1251)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (42 U.S.C. §9601) Amended by the Superfund Amendments and Reauthorization Act (SARA)
- Emergency Planning and Community Right to Know Act (EPCRA) of 1986 (42 U.S.C. §11001 et seq.) (Also known as SARA Title III.)
- Endangered Species Act (ESA) (16 U.S.C.§1531 et seq.)
- Federal Facility Compliance Act (FFCA) of 1992 (42 U.S.C. §6961)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 U.S.C. §136)
- Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. §703 et seq.)
- National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. §4321)
- National Historic Preservation Act of 1966, as amended (16 U.S.C. §470 et seq.)
- Pollution Prevention Act of 1990 (42 U.S.C. §13101 et seq.)
- Quiet Communities Act of 1978 (42 U.S.C. §4901 et seq.)
- Resource Conservation and Recovery Act (RCRA) of 1976 (42 U.S.C. §6901 et seq.)
- Safe Drinking Water Act (SDWA) (42 U.S.C §300f)
- Superfund Amendments and Reauthorization Act (SARA) of 1986 (see CERCLA)
- Toxic Substances Control Act (TSCA) of 1976 (15 U.S.C. §2601 et seq.)

Note: U.S.C. = United States Code

APPLICABLE LOCAL AND STATE LAWS AND REGULATIONS FOR ENVIRONMENTAL PROGRAMS

Water Quality

20 NMAC 6.2, “Ground and Surface Water Protection”
20 NMAC 6.4, “Standards for Interstate and Intrastate Surface Waters”
20 NMAC 7.3, “Liquid Waste Disposal and Treatment” (includes effluents to sewer and septic tanks)
20 NMAC 7.10, “Drinking Water”
City of Albuquerque, “Sewer Use and Wastewater Control Ordinance” (Albuquerque Code of Ordinances Chapter 6, Article 3)

Air Quality

20 NMAC 11, “Albuquerque/Bernalillo County Air Quality Control Board Regulations”

Miscellaneous

NMSA 76-4-1 et seq.,“New Mexico Pesticide Control Act”
21 NMAC 17.50, “Pesticides”

Oil Storage and Spill Containment

Oil Storage Programs
20 NMAC 5, "Petroleum Storage Tanks"

Waste Management

Hazardous Waste Management Program
20 NMAC 4.3, "Annual Hazardous Waste Fees"
20 NMAC 9.1, "Solid Waste Management"

Solid Waste Program
20 NMAC 9.1, "Solid Waste Management"

TABLE 9-1. Summary of Environmental Permits and Registrations in Effect During 2005

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
SEWER WASTEWATER					
General	WW001 Station Manhole, south of TA-IV at Tijeras Arroyo	2069 A-6	7/1/03	12/31/07	COA
General	WW006 Station Manhole, at Pennsylvania Ave.	2069 F-6	8/1/03	1/31/08	COA
Microelectronics Development Laboratory (MDL)	WW007 Station Manhole, TA-I	2069 G-6	10/12/05	8/31/09	COA
General	WW008 Station Manhole, south of TA-II at Tijeras Arroyo	2069 I-5	2/1/004	7/31/08	COA
General	WW011 Station Manhole, north of TA-III (includes TAs-III and V, and Coyote Test Field sewer lines)	2069 K-5	11/17/04	12/31/08	COA
SURFACE DISCHARGE					
Pulsed Power Development Facilities (Discharge Plan)	TA-IV, Lagoons I and II	DP-530	9/21/01	9/21/06	NMED
UNDERGROUND STORAGE TANKS (UST)					
UST (20,000 gallons)	TA-I	1368	6/1/05	6/30/06	NMED
UST (20,000 gallons)	TA-I	1369	6/1/05	6/30/06	NMED
ABOVE GROUND STORAGE TANKS (AST)					
AST / 10,000	TA-I	1370	6/1/05	6/30/06	NMED
AST / 10,000	TA-I	1370	6/1/05	6/30/06	NMED
AST / 10,000	TA-I	1370	6/1/05	6/30/06	NMED
AST / 1,500	TA-I	1370	6/1/05	6/30/06	NMED
AST / 2,000	TA-I	1370	6/1/05	6/30/06	NMED
AST / 5,000	TA-III	1370	6/1/05	6/30/06	NMED
AST / 25,000	CTF	1370	6/1/05	6/30/06	NMED

See notes at end of table.

TABLE 9-1. Summary of Environmental Permits and Registrations in Effect During 2005 *(continued)*

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
STORM WATER					
National Pollution Discharge Elimination System (NPDES) "Multi-sector General" Permit	Storm water discharges from Points (MP) 01 through MP 10	NMR05A961	2/01	9/30/05 EPA has indefinitely extended this Permit	EPA
NPDES Construction Permits					
Center for Integrated Nanotechnology (CINT) CORE Facility Construction Project	Eubank	NMR15DC23	10/21/03	6/30/06	EPA
Microsystems and Engineering Science Applications (MESA) Facility	TA-I	NM0002376	N/A	7/31/09	EPA
Exterior Communication Infrastructure Modernization (ECIM) Project	TA-I	NMR15DC79	3/1/04	6/30/06	EPA
Photovoltaics Parking Lot	Photovoltaics Parking Lot	NMR15DV49	11/05/04	6/30/05	EPA
Building 956 - Lot A	Building 956	NMR15DW01	11/12/04	5/30/05	EPA
Building 1090	TA-I	NMR15E170	2/8/2005	9/30/2005	EPA
20th Street Stockpile Area	TA-I	NMR15E764	04/29/05	3/30/2007	EPA
46kV Line Partial Circuit #2 Replacement	TA-III-IV	NMR15ED84	07/14/05	1/30/2006	EPA
National Infrastructure Simulation and Analysis Center (NISAC) Building 1008	TA-II	NMR15EL42	11/1/2005	11/30/2006	EPA
TA-1 Waterline Replacement Phase III	TA-I	NMR15EO38	12/16/2005	3/28/2007	EPA
46kV Feeder #1 Replace & Switching Station	TA-III-IV	NMR15EO48	12/21/2005	10/30/2007	EPA
New Master Substation Utility - Sub-42	TA-IV	NMR15EO73	12/23/2005	5/30/2007	EPA
WAIVERS					
Building 1090 Parking Lot	TA-II	NMLEW0297	12/14/2005	7/1/2006	EPA
9990 Com Trench	TA-III	NMLEW0303	12/27/2005	6/30/2006	EPA
COMPLETED PROJECTS					
Aerial Cable Facilities Renovation	Sol se Mete Canyon	NMR15DD44	3/12/04	5/30/05	EPA
Building 755	Building 755	NMR15DK40	8/9/04	4/15/05	EPA
TA-I Waterline Rehabilitation Project	TA-I	NMR15DR15	9/9/04	10/30/05	EPA
Building 702 Construction	Building 702	NMLEW108	8/9/2004	4/15/05	EPA
Building 758 Construction	Building 758	NA	12/21/04	7/8/05	EPA
TA-II & TA-IV Improvements	TA-II and TA-IV	NMR15DY00	12/8/04	6/30/05	EPA
Building 729	Building 729	NMR15DY97	1/4/05	7/31/05	EPA
ECOLOGICAL					
U.S. Fish and Wildlife Service Special Purpose Salvage Permit	Site-Wide Ecological Monitoring	MB040780-0	5/30/01	12/31/05	U.S. Fish and Wildlife Service
U.S. Fish and Wildlife Service Special Purpose Relocate Permit	Site-Wide Ecological Monitoring Activity	MB105852-0	5/26/05	6/30/05	U.S Fish and Wildlife Service

See notes at end of table.

TABLE 9-1. Summary of Environmental Permits and Registrations in Effect During 2005 *(continued)*

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
RCRA					
RCRA Part B Operating Permit for the Hazardous Waste Management Facility (HWMF) Module I - General Permit Conditions Module II - General Facility Conditions Module III - Containers	HWMF, TA-II (storage)	NM5890110518-1	8/6/92	08/06/02 [a] ** (request for renewal submitted 2/6/02, most recent revision submitted 11/29/2004)	NMED
RCRA Part B Operating Permit Module IV - Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units (SWMUs)	Environmental Restoration (ER) Sites	NM5890110518-1	8/26/93	9/20/02 [a]** (request for renewal submitted 2/6/02, most recent revision submitted 11/04)	EPA/NMED
Thermal Treatment Facility (TTF) Module I - General Permit Conditions Module II - General Facility Conditions Module III - Containers	TTF, TA-III, Bldg. 6715 (Treatment of explosive waste)	NM5890110518-2	12/4/94	12/4/04a ** (request for renewal submitted 2/6/02, most recent revision approved 12/29/05)	NMED
Class III Permit Modification for the Management of Hazardous Remediation Waste in the Corrective Action Management Unit (CAMU), Tech Area III Modification to Part B Operating Permit	CAMU, TA-III	NM5890110518	9/25/97	9/20/02 [a]** (request for renewal submitted 2/6/02, most recent revision submitted 12/03)	NMED
RCRA Part A Permit Application for Hazardous Waste Management Units for the hazardous component in mixed waste stored and/or treated at ten waste management areas.	RMWMF (storage and treatment); 7 Manzano Bunkers (storage only); Auxiliary Hot Cell Facility (storage and treatment)	NM5890110518	Application for interim status first submitted 8/90; most recent revision 10/25/05	Under Review[a] (No expiration date)	NMED
RCRA Part B Permit Application for Hazardous Waste Management Units for the hazardous component in mixed waste stored and/or treated at seven waste management areas.	RMWMF (MW treatment and storage); 5 Manzano Bunkers (storage only); Auxiliary Hot Cell Facility (storage and treatment)	NM5890110518	Application first submitted in 1992. Most recent revision submitted 10/25/05	Under Review [a]	NMED
TSCA					
Risk-Based Approval Request under 40 CFR 761.61(c); Risk-Based Method for Management of PCB Materials; Chemical Waste Landfill and Corrective Action Management Unit (CAMU)	Chemical Waste Landfill and CAMU, co-located in TA-III	N/A	6/26/02	CAMU Closure Report submitted 4/19/04. CWL permit continues until closure. CWL closure delayed pending NMED remedy selection process; closure expected late 2007.	EPA, Region 6

See notes at end of table.

TABLE 9-1. Summary of Environmental Permits and Registrations in Effect During 2005 *(continued)*

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
Open Burn Permits*					
Water Impact Facility	Bldg. 6510	#04-0115	1/1/05	12/31/05	COA
Burn Site / Sled	Open Ring	#04-0122	1/1/05	12/31/05	COA
10,000' Sled Track	South End	#04-0123	12/1/04	12/31/05	COA
TTF	Bldg. 6715	#04-0124	1/1/05	12/31/05	COA
Lurance Burn Site	Igloo 9830	#04-0125	1/1/05	12/31/05	COA
Lurance Burn Site	Large Pool	#04-0126	1/1/05	12/31/05	COA
10,000' Sled Track	South End C-4	#05-0133	1/1/05	12/31/05	COA
10,000' Sled Track	South End LNG	#05-0134	1/1/05	12/31/05	COA
Explosives	Bldg. 9940	#05-0144	1/1/05	12/31/05	COA
10,000' Sled Track	South End	#05-0145	1/1/05	12/31/05	COA
Fire Extinguisher	off 9th Street	#05-0154	2/1/05	12/31/05	COA
Explosives	Bldg. 9940	#05-0157	2/1/05	12/31/05	COA
Impact Test Facility	Bldg. 6750	#05-0159	2/1/04	12/31/05	COA
Impact Test Facility	Bldg. 6750	#05-0160	2/1/04	12/31/05	COA
Impact Test Facility	Bldg. 6750	#05-0161	2/1/04	12/31/05	COA
10,000' Sled Track	South End	#05-0183	4/1/05	12/31/05	COA
Lurance Burn Site	Large Pool 250 gal. #2	#05-0222	9/1/05	12/31/05	COA
Spartan Rocket Demolition	Igloo Building 9965A	#05-0230	9/1/05	12/31/05	COA
AIR (Permits & Registrations)					
Hammermill Facility	TA-III	144	08/28/85	Biennial update	COA
Fire Laboratory used for the Authentication of Modeling and Experiments (FLAME)	Burn Site	196	5/19/88	Registration†	COA
High Energy Radiation Megavolt Electron Source-III (HERMES-III)	TA-III	NESHAP	6/29/88	Approval††	EPA, Region 6
Neutron Generator Facility (NGF)	TA-I	374- M1	7/17/98	Biennial update	COA
Standby diesel generators (four)	TA-I	402 (old 150)	5/07/96	Biennial update	COA
Radioactive and Mixed Waste Management Facility (RMWMF)	TA-III	415- M1	5/10/97	Biennial update	COA
Title V Operating Permit	Site-Wide	515 (pending)	Submitted[a] 3/1/96	Pending (5 yr renewal)	COA

See notes at end of table.

TABLE 9-1. Summary of Environmental Permits and Registrations in Effect During 2005 *(concluded)*

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
AIR (Permits & Registrations) (concluded)					
Emergency Generator	TA-I	924	5/5/98	Biennial update	COA
Processing and Environmental Technology Laboratory (PETL)	TA-I	925-M1	3/5/01	Biennial update	COA
Processing and Environmental Technology Laboratory (PETL)	TA-I	936	5/5/04	Registration	COA
Advanced Manufacturing Prototype Facility (AMPF)	TA-I	1406	11/6/00	Registration	COA
Microelectronics Development Laboratory (MDL)	TA-I	1678	12/23/02	Biennial update	COA
Steam Plant	TA-I	1705	11/10/04	Biennial update	COA
Thermal Test Complex	TA-III	1712	4/9/04	Biennial update	COA
Center for Integrated Nanotechnology (CINT)	Sandia Science & Technology Park	1725	10/11/04	Biennial update	COA
FUGITIVE DUST CONTROL AND DEMOLITION PERMIT FILE* (Permits & Registrations)**					
ESH Building 1090	TA-II	10-86-3058	1/19/2005	9/1/2006	COA
Building 729	TA-I	10-204-3060	1/24/2005	1/24/2006	COA
Building 758	TA-I	10-468-3070	1/31/2005	1/31/2006	COA
CWL's Cover	TA-III	10-411-3090	3/2/2005	3/2/2006	COA
Soil Stockpile	TA-I	10-348-3106	3/16/2005	3/16/2006	COA
Building 755	TA-I	10-344-3128	3/6/2005	3/6/2006	COA
Building 6536	TA-I	10-210-3224	7/22/2005	7/22/2006	COA
TA-II Building Demolition	TA-II	10-210-3251	9/1/2005	9/1/2006	COA
Building 9940 Programmatic	Outside TA-III	P05-0057	11/10/2005	11/10/2010	COA

NOTES: †Registration = Certificate - no permit required
Approval = EPA did not issue a permit to NMED on 02/06/2002
[a]Combined with application for permit renewal submitted
PCB = polychlorinated biphenyl
*Open Burn Permits are issued by the City of Albuquerque
for no more than a year at any one time.
**Sandia submitted a timely application for permit renewal
(RCRA Part A and Part B permit applications) to NMED on 02/06/2002. The old permit remains in force until the new one is issued.
***Permits are obtained by general contractors directly from City of Albuquerque
COA= City of Albuquerque
TA= technical area
EPA = U.S. Environmental Protection Agency
N/A = not applicable
NMED = New Mexico Environment Department
RCRA = Resource Conservation and Recovery Act

This page intentionally left blank.

TABLE 9-2. Federal and State Air Regulations Applicable to SNL/NM

CAA Title	CAA Section	Federal Regulation	Local Regulation	Subject
I	176(c)	40 CFR 51 40 CFR 93	20 NMAC 11.04 20 NMAC 11.03	Conformity of Federal Actions (State and Federal Plans) General and Transportation
	110	40 CFR 58	N/A	Ambient Air Quality Surveillance
	109	40 CFR 50	20 NMAC 11.01	National Primary and Secondary Ambient Air Quality Standards (NAAQS)
	165-166	40 CFR 52	20 NMAC 11.02	Permit Fees
		40 CFR 52	20 NMAC 11.05	Visible Air Contaminants
		40 CFR 52	20 NMAC 11.06	Emergency Action Plan
		40 CFR 52	20 NMAC 11.07	Variance Procedure
		40 CFR 52	20 NMAC 11.20	Fugitive Dust Control
		40 CFR 52	20 NMAC 11.21	Open Burning
		40 CFR 51–52	20 NMAC 11.40	Source Registration
		40 CFR 51–52	20 NMAC 11.41	Authority-to-Construct
		40 CFR 51.100	20 NMAC 11.43	Stack Height Requirements
		40 CFR 51	20 NMAC 11.44	Emissions Trading
	171-193	40 CFR 51–52	20 NMAC 11.60	Permitting in Nonattainment Areas
	160-169	40 CFR 52	20 NMAC 11.61	Prevention of Significant Deterioration
	165-166	40 CFR 60 40 CFR 63	20 NMAC 11.65	Volatile Organic Compounds (VOC)
		40 CFR 60	20 NMAC 11.66	Process Equipment
		40 CFR 60	20 NMAC 11.22	Wood Burning
		40 CFR 60	20 NMAC 11.63	New Source Performance Standards (NSPS)
		40 CFR 60	20 NMAC 11.67	Equipment, Emissions and Limitations (stationary combustion sources)
		40 CFR 60	20 NMAC 11.68	Incinerators
II	202-210 213-219 211	40 CFR 60	20 NMAC 11.69	Pathological Waste Destructors
		40 CFR 85-86	20 NMAC 11.100	Motor Vehicle Inspection: Decentralized
			20 NMAC 11.101	Motor Vehicle Inspection: Centralized
		40 CFR 80	20 NMAC 11.102	Oxygenated Fuels
			20 NMAC 11.103	Motor Vehicle Visible Emissions
III	112	40 CFR 61 40 CFR 63	20 NMAC 11.64	National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart H – Radionuclides Subpart M – Asbestos
IV	401-416	40 CFR 72-78	20 NMAC 11.62	Acid Rain
V	501-507	40 CFR 70-71	20 NMAC 11.42	Operating Permits
VI	601-618	40 CFR 82	20 NMAC 11.23	Stratospheric Ozone Protection
VII	113-114	40 CFR 64	20 NMAC 11.90	Administration, Enforcement, Inspection

NOTES: CAA = Clean Air Act
NMAC = New Mexico Administrative Code

TABLE 9-3. Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM

Date	Milestone	Comment
1984	Amendments to Resource Conservation and Recovery Act (RCRA) and Hazardous and Solid Waste Amendments (HSWA) in 1984	MW became an issue after amendments to RCRA and HSWA enforced Land Disposal Restrictions (LDRs), including prohibition on storage of wastes for more than one year.
Aug 1990	RCRA Part A Interim Status Permit Application	Submitted RCRA Part A Interim Status Permit application for MW storage. Later revisions to the interim status permit added proposed MW treatment processes.
Oct 1992	Federal Facilities Compliance Act (FFCA) Passed	The FFCA allows storage of MW over one-year RCRA time limit. Requires U.S. Department of Energy (DOE) to submit a site treatment plan for MW.
Dec 1992	Notice of Noncompliance (NON) Issued	U.S. Environmental Protection Agency (EPA) issued a NON for storage of RCRA-regulated MW over the one-year maximum period.
Oct 1993	Conceptual Site Treatment Plan Submitted	DOE submitted *Conceptual Site Treatment Plan for Mixed Waste* to NMED; other drafts followed.
Mar 1995	Final Site Treatment Plan submitted	DOE submitted final *Site Treatment Plan for Mixed Waste* to NMED
Jun 1995	Historical Disposal Requests Validation (HDRV) Project Initiated	The HDRV Project was initiated to characterize and sort legacy MW. Project continued into 1997, when it was replaced with new sorting procedures
Oct 1995	Federal Facility Compliance Order (FFCO) Signed	The FFCO, an agreement between State, DOE, and Sandia Corporation, details specific actions required with regard to MW management, including the requirement to develop of a Site Treatment Plan (STP), to be updated annually
Oct 1995	Compliance Order Issued	NMED issued a Compliance Order enforcing the STP
Sep 1996	First MW Shipment	First MW shipment made to Perma-Fix/DSSI
Oct 1996	FFCO Amendment No. 1	FFCO amended
Dec 1996	Revisions to Proposed Treatment Methods	DOE and Sandia re-submitted Part A and B permit application, to reflect revisions to proposed on-site treatment methods
May 1997	FFCO Amendment No. 2	FFCO amended
Dec 1997	On-site MW Treatment	Onsite treatment of MW began at the RMWMF in Bldg. 6920. Additionally, Bldg. 6921 was converted to a laboratory for the treatment of certain types of MW
1997	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1996 activities, and changes to proposed treatment technologies. NMED approved Revision 1 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
1998	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1997 activities, and changes to proposed treatment technologies. NMED approved Revision 2 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
1999	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1998 activities, and changes to proposed treatment technologies. NMED approved Revision 3 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.

See notes at end of table.

TABLE 9-3. Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM (concluded)

Date	Milestone	Comment
2000	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1999 activities, and changes to proposed treatment technologies. NMED approved Revision 4 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
2001	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2000 activities, and changes to proposed treatment technologies. NMED approved Revision 5 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
2001	FFCO Amendment No. 3	FFCO amended
2002	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2001 activities, and changes to proposed treatment technologies. NMED approved Revision 6 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
Feb 2002	Revisions to Permit Application	DOE and Sandia submitted updated Part A and B permit application, to reflect revisions to on-site waste management operations. Permit application for mixed waste management units is combined with permit renewal request for hazardous waste management units at SNL/NM.
2003	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2002 activities, and changes to proposed treatment technologies. NMED approved Revision 7 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
2004	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2003 activities, and changes to proposed treatment technologies. NMED approved Revision 8 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
2004	FFCO Amendment No. 4	FFCO amended
2005	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2004 activities, and changes to proposed treatment technologies. NMED approved Revision 9 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.

NOTES: NON = Notification of Non-compliance
RCRA = Resource Conservation and Recovery Act
HSWA = Hazardous and Solid Waste Amendments
FFCA = Federal Facility Compliance Act
NMED = New Mexico Environment Department
DSSI = Diversified Scientific Services, Inc.
FY = fiscal year
DOE = Department of Energy
HDRV = Historical Disposal Requests Validation
STP = Site Treatment Plan
FFCO = Federal Facility Compliance Order
MW = Mixed Waste

TABLE 9-4. Mixed Waste Treatment and Disposal Status (End of FY 2005)

Waste Category	Volume (m^3)	Description	Status and Plans
TG 1	0	Inorganic Debris with Explosive Component	No waste currently in inventory
TG 2	0	Inorganic Debris with a Water Reactive Component	No waste currently in inventory.
TG 3	0	Reactive Metals	No waste currently in inventory.
TG 4	0	Elemental Lead	No waste currently in inventory.[a]
TG 5	0	Aqueous Liquids (Corrosive)	No waste currently in inventory.
TG 6	0	Elemental Mercury	No waste currently in inventory.
TG 7	0	Organic Liquids I	No waste currently in inventory.
TG 8	0	Organic Debris with Organic Contaminants	No waste currently in inventory.
TG 9	0.003	Inorganic Debris with TCLP Metals	Utilizing on-site treatment or shipping to off-site treatment and disposal facilities.[a]
TG 10	0.2	Heterogeneous Debris	Sort waste as needed to determine more suitable treatability groups.
TG 11	0	Organic Liquids II	No waste currently in inventory.
TG 12	1.6	Organic Debris with TCLP Metals	Utilizing off-site treatment and disposal options.[a]
TG 13	0	Oxidizers	No waste currently in inventory.
TG 14	0	Aqueous Liquids with Organic Contaminants	No waste currently in inventory.
TG 15	0	Soils <50 percent Debris & Particulates with TCLP Metals	No waste currently in inventory.
TG 16	0	Cyanide Waste	No waste currently in inventory.
TG 17	0.04	Liquid/Solid with Organic and/or Metal Contaminants	Utilizing on-site treatment and off-site treatment and disposal options.[a]
TG 18	0	Particulates with Organic Contaminants	No waste currently in inventory.
TG 19	0	Liquids with Metals	No waste currently in inventory.
TG 20	1.0	Propellant with TCLP Metals	Utilizing on-site treatment and off-site treatment and disposal options.[a]
TG 21	0.007	Sealed Sources with TCLP Metals	Utilizing on-site treatment and off-site treatment and disposal options.
TG 22	0	Reserved	Not Applicable
TG 23	0	Thermal Batteries	No waste currently in inventory.
TG 24	0.02	Spark Gap Tubes with TCLP Metals	Utilizing on-site treatment and off-site treatment options, and investigating off-site disposal options.[a]
TG 25	8.6	Classified Items with TCLP Metals	Sort waste as needed to determine more suitable treatability groups.
TG 26	0	Debris Items with Reactive Compounds & TCLP Metals	No waste currently in inventory
TG 27	0	High Mercury Solids & Liquids	No waste currently in inventory
TRU/MW	1.05	TRU/MW	Investigating off-site treatment and disposal options.

NOTES: [a] Treatment and/or disposal at one or more permitted off-site mixed waste management facilities. Treatments are detailed in the *Site Treatment Plan for Mixed Waste, Sandia National Laboratories, New Mexico* (SNL 2005m) and the *Site Treatment Plan for MW, FY04 Update* (SNL 2005l).

RADIOLOGICAL DOSE

Radiation Protection

The U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) has established radiation protection standards for the public to control and limit radiation doses resulting from activities at DOE facilities. Sandia National Laboratories, New Mexico (SNL/NM) is the DOE facility specific to this discussion. Public areas are defined as any location that is accessible to non-DOE facility employees (e.g., excluding Sandia Corporation employees and contractors), such as Kirtland Air Force Base (KAFB) personnel and the surrounding community. Radiation protection standards are provided in DOE Order 5400.5, *Radiation Protection of the Public and the Environment* (DOE 1993a). Environmental monitoring requirements for DOE operations are given in DOE Order 450.1, *Environmental Protection Program* (DOE 2005). In addition to these quantitative standards, the overriding DOE policy is that exposures to the public shall be maintained "as low as reasonably achievable" (ALARA).

DOE Order 5400.5 limits the total annual effective dose equivalent (EDE) of all potential exposure pathways to the public (including air, water, and the food chain) to 100 millirem per year (mrem/yr). The Order lists the Derived Concentration Guides (DCGs) for radionuclides in water and air that could be continuously consumed or inhaled (365 days/year). This is a conservative approach that assumes that a member of the public resides at the location continuously. Table 9-5 lists the DCGs pertinent to activities at SNL/NM and to this report.

TABLE 9-5. Derived Concentration Guides (DCGs) for Selected Radionuclides*

	Ingested Water		Inhaled Air†	
Radionuclide	**DCG (µCi/ml)**	**f_1 Value****	**DCG (µCi/ml)**	**Solubility Class**
Tritium (water)	2×10^{-3}	--	1×10^{-7}	W
Cesium-137	3×10^{-6}	1	4×10^{-10}	D
Uranium, total (U_{tot})	6×10^{-6}	--	1×10^{-13}	Y

NOTES: µCi/ml = microcuries per milliliter
*From Figure III-1, DOE Order 5400.5, Change 2, January 7, 1993 (DOE 1993).
DCG for tritium in air is adjus
** F_1 value is the gastrointestinal absorption factor.
Listed DCG's for U_{tot} are based on U_{nat} listing in 5400.5.

- *Water Pathways* - DOE drinking water guidelines are based on an annual EDE not to exceed 4 mrem/yr. Guideline values for drinking water are calculated at 4 percent of ingested water using DCG values for specific nuclides.

- *Air Pathways* - DOE facilities are required to comply with U.S. Environmental Protection Agency (EPA) standards for radiation protection as given in National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart H, specific to radionuclides emitted from DOE facilities (with the exception of radon). This rule mandates that air emissions from DOE facilities shall not cause any individual of the public to receive an EDE of greater than 10 mrem/yr from air pathways. Table 9-6 summarizes the public radiation protection standards that are applicable to DOE facilities.

WATER QUALITY MONITORING PARAMETERS

Resource Conservation and Recovery Act (RCRA)

Table 9-7 lists the 40 CFR 265, Subpart F, parameters required for groundwater monitoring analysis, implemented under RCRA. Table 9-8 gives the EPA interim primary drinking water standards (40 CFR 265, Appendix III) for the groundwater monitoring parameters. Table 9-9 gives EPA secondary drinking water standards. At SNL/NM, this regulation applies to Environmental Restoration (ER) sites. Table 9-10 gives New Mexico Water Quality Control Commission (NMWQCC) Standards for groundwater.

TABLE 9-6. General Dose Limits to the Public from DOE Facilities

Pathway	Effective Dose Equivalent (EDE) Limit	Comments
All Pathways*	100 mrem/yr 1 mSv/yr	The EDE for any member of the public from all routine DOE operations (normal planned activities including remedial actions). Radiation dose occurring from natural background and medical exposures are not included in the total allowed dose from all pathways.
Air Pathway **	10 mrem/yr 0.10 mSv/yr	Sandia Corporation calculates doses resulting from all potential air depositions and direct inhalation (e.g., emissions, ground shine, food crops)

NOTES: *DOE Order 5400.5, Chapters I and II (DOE 1993a)
**40 CFR 61, Subpart H for radionuclides, National Emission Standards for Hazardous Air Pollutants (NESHAP).
mrem/yr = millirem per year mSv/yr = millisievert per year DOE = Department of Energy

TABLE 9-7. Groundwater Monitoring Parameters Required by 40 CFR 265, Subpart F*

Contamination Indicator	Groundwater Quality	Appendix III† Drinking Water Supply
pH	Chloride	Arsenic
Specific Conductivity	Iron	Barium
Total Organic Halogen (TOX)	Manganese	Cadmium
Total Organic Carbon (TOC)	Phenol	Chromium
	Sodium	Fluoride
	Sulfate	Lead
		Mercury
		Nitrate (as N)
		Selenium
		Silver
		Endrin
		Lindane
		Methoxychlor
		Toxaphene
		2,4-D
		2,4,5-TP Silvex
		Radium
		Gross Alpha
		Gross Beta
		Coliform Bacteria
		Turbidity

NOTES: *Resource Conservation and Recovery Act (RCRA)
†40 CFR 265, Appendix III.
pH = potential of hydrogen (acidity)

TABLE 9-8. EPA Primary Drinking Water Supply Standards/New Mexico Drinking Water Standards

Inorganic Chemicals	MCL	Units
Antimony	0.006	mg/L
Arsenic	0.010	mg/L
Asbestos	7	MFL
Barium	2.0	mg/L
Beryllium	0.004	mg/L
Cadmium	0.005	mg/L
Chromium	0.1	mg/L
Copper	1.3*	mg/L
Cyanide (free cyanide)	0.2	mg/L
Fluoride	4.0	mg/L
Lead	0.015	mg/L
Mercury (inorganic)	0.002	mg/L
Nickel (New Mexico only) [5]	0.2	mg/L
Nitrate (measured as N)	10	mg/L
Nitrite (measured as N)	1	mg/L
Total Nitrate and Nitrite (measured as N)	10	mg/L
Selenium	0.05	mg/L
Thallium	0.002	mg/L
Organic Chemicals	**MCL**	**Units**
Alachlor	0.002	mg/L
Atrazine	0.003	mg/L
Benzene	0.005	mg/L
Benzo(a)pyrene	0.0002	mg/L
Carbofuran	0.04	mg/L
Carbon tetrachloride	0.005	mg/L
Chlordane	0.002	mg/L
Chlorobenzene	0.1	mg/L
2,4-D	0.07	mg/L
Dalapon	0.2	mg/L
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	mg/L
o-Dichlorobenzene	0.6	mg/L
p-Dichlorobenzene	0.075	mg/L
1,2-Dichloroethane	0.005	mg/L
1,1-Dichloroethylene	0.007	mg/L
cis-1,2-Dichloroethylene	0.07	mg/L
trans-1,2-Dichloroethylene	0.1	mg/L
Dichloromethane	0.005	mg/L
1,2-Dichloropropane	0.005	mg/L
Di(2-ethylhexyl)adipate	0.4	mg/L
Di(2ethylhexyl)phthalate	0.006	mg/L
Dinoseb	0.007	mg/L
Dioxin (2,3,7,8-TCDD)	0.00000003	mg/L
Diquat	0.02	mg/L
Endothall	0.1	mg/L
Endrin	0.002	mg/L

See notes at end of table.

TABLE 9-8. EPA Primary Drinking Water Supply Standards/New Mexico Drinking Water Standards *(concluded)*

Organic Parameter (continued)	MCL	Units
Ethylbenzene	0.7	mg/L
Ethylene Dibromide	0.00005	mg/L
Glyphosate	0.7	mg/L
Heptachlor	0.0004	mg/L
Heptachlor epoxide	0.0002	mg/L
Hexachlorobenzene	0.001	mg/L
Hexachlorocyclopentadiene	0.05	mg/L
Lindane	0.0002	mg/L
Methoxychlor	0.04	mg/L
Oxamyl (Vydate)	0.2	mg/L
Polychlorinated biphenyls (PCBs)	0.0005	mg/L
Pentachlorophenol	0.001	mg/L
Picloram	0.5	mg/L
Simazine	0.004	mg/L
Styrene	0.1	mg/L
Tetrachloroethylene	0.005	mg/L
Toluene	1	mg/L
Total Trihalomethanes (TTHMs)	0.1	mg/L
Toxaphene	0.003	mg/L
2,4,5-TP (Silvex)	0.05	mg/L
1,2,4-Trichlorobenzene	0.07	mg/L
1,1,1-Trichloroethane	0.2	mg/L
1,1,2-Trichloroethane	0.005	mg/L
Trichloroethylene	0.005	mg/L
Vinyl chloride	0.002	mg/L
Xylenes (total)	10	mg/L
Radionuclides	**MCL**	**Units**
Beta particles and photon emitters	4	mrem/yr
Gross alpha particle activity	15	pCi/L
Radium 226 and Radium 228 (combined)	5	pCi/L
Uranium	0.030	mg/L

NOTES: *action level concentrations which trigger systems into taking treatment steps if 10 percent of tap water samples exceed the value
**New Mexico Drinking Water Standard only, EPA removed nickel in 1995
MCL = Maximum Contaminant Level
mg/L = milligram per liter; ml = milliliter
MFL= Micro-fibers per liter
mrem/yr = millirem per year
pCi/L = picocurie per liter

TABLE 9-9. EPA Secondary Drinking Water Supply Standards

Contaminant	Level
Aluminum	0.05 to 0.2 mg/L
Chloride	250 mg/L
Color	15 color units
Copper	1.0 mg/L
Corrosivity	Non-corrosive
Fluoride	2.0 mg/L
Foaming agents	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor	3 threshold odor number
pH	6.5-8.5
Silver	0.1 mg/L
Sulfate	250 mg/L
Total dissolved solids (TDS)	500 mg/L
Zinc	5 mg/L

NOTES: EPA = Environmental Protection Agency
mg/L = milligram per liter
pH = potential of hydrogen (acidity)

TABLE 9-10. New Mexico Water Quality Control Commission (NMWQCC) Standards for Groundwater of 10,000 mg/L total dissolved solid (TDS) Concentration or Less

Contaminant	NMWQCC Standard	Units
A. Human Health Standards		
Arsenic	0.1	mg/L
Barium	1.0	mg/L
Cadmium	0.01	mg/L
Chromium	0.05	mg/L
Cyanide	0.2	mg/L
Fluoride	1.6	mg/L
Lead	0.05	mg/L
Total Mercury	0.002	mg/L
Nitrate (as N)	10.0	mg/L
Selenium	0.05	mg/L
Silver	0.05	mg/L
Uranium	5.0	mg/L
Radioactivity: Radium-226 & Radium 228	30.0	pCi/L
Benzene	0.01	mg/L
Polychlorinated biphenyls (PCB's)	0.001	mg/L
Toluene	0.75	mg/L
Carbon Tetrachloride	0.01	mg/L
1,2-dichloroethane (EDC)	0.01	mg/L
1,1-dichloroethylene (1,1-DCE)	0.005	mg/L
1,1,2,2-tetrachloroethylene (PCE)	0.02	mg/L
1,1,2- trichloroethylene (TCE)	0.1	mg/L
Ethylbenzene	0.75	mg/L
Total Xylene	0.62	mg/L
Methylene Chloride	0.1	mg/L
Chloroform	0.1	mg/L
1,1 –dichloroethane	0.025	mg/L
Ethylene dibromide (EDB)	0.0001	mg/L
1,1,1 –trichloroethane	0.06	mg/L
1,1,2 –trichloroethane	0.01	mg/L
1,2,2,2 –tetrachloroethane	0.01	mg/L
Vinyl Chloride	0.001	mg/L
PAHs: total naphtalene + monomethylnapthalenes	0.03	mg/L
Benzo(a)pyrene	0.0007	mg/L
B. Other Standards for Domestic Water Supply		
Chloride	250.0	mg/L
Copper	1.0	mg/L
Iron	1.0	mg/L
Manganese	0.2	mg/L
Phenols	0.005	mg/L
Sulfate	600.0	mg/L
Total Disolved Solids	1000.0	mg/L
Zinc	10.0	mg/L
pH	Between 6 and 9	

NOTES: mg/L = milligram per liter
MAC = maximum allowable concentration
pH = potential of hydrogen (acidity)
pCi/L = picocurie per liter

TABLE 9-10. New Mexico Water Quality Control Commission (NMWQCC) Standards for Groundwater of 10,000 mg/L total dissolved solid (TDS) Concentration or Less *(concluded)*

Contaminant	NMWQCC Standard	Units
C. Standards for Irrigation Use – Groundwater shall meet the standards of Subsection A,B, and C unless other wise provided		
Aluminum	5.0	mg/L
Boron	0.75	mg/L
Cobalt	0.05	mg/L
Molybdenum	1.0	mg/L
Nickel	0.2	mg/L

NOTES: mg/L = milligram per liter
MAC = maximum allowable concentration
pCi/L = picocurie per liter

This page intentionally left blank.

APPENDIX A
2005 WASTEWATER MONITORING RESULTS

This page intentionally left blank.

CONTENTS

TABLES

This page intentionally left blank.

TABLE A-1. Permitted Sanitary Outfalls, March 2005
(All results in milligrams per liter [mg/L] unless otherwise noted.)

Permit Number:	2069-A		2069F-4		2069G-2		2069I-3		2069-K		Regulatory
Station:	WW001		WW006		WW007		WW008		WW011		Limit
Date Collected:	3/8/2005		3/8/2005		3/8/2005		3/8/2005		3/8/2005		COA
Sample ID:	066895		066896		066897		066898		066899		(mg/L)
Analyte											
Aluminum	0.14		0.453		0.699		0.743		0.178		900
Arsenic	0.0198		0.00957		0.00238	U	0.0125		0.0165		0.051
Boron	0.138		0.174		0.0232	J	0.117		0.134		NE
Cadmium	0.00137	J	0.00102	J	0.000386	U	0.000513	J	0.00114	J	0.5
Chromium	0.0022	J	0.00299	J	0.00216	J	0.00672		0.0044	J	4.1
Copper	0.0345		0.0261		0.00213	J	0.0129		0.0257		5.3
Fluoride	0.53		0.472		1.83		3.39		0.396		36
Lead	0.00266	U	0.00266	U	0.00266	U	0.00266	U	0.00266	U	1
Molybdenum	0.171		0.0337		0.0113		0.0617		1.78		2
Nickel	0.0026	J	0.00394	J	0.00181	J	0.00351	J	0.00301	J	2
Selenium	0.0169	U	0.0338	U	0.00338	U	0.0169	U	0.0338	U	0.46
Silver	0.00133	BJ	0.0205	B	0.00141	BJ	0.00157	BJ	0.00178	BJ	5
Zinc	0.0878		0.119		0.0036	J	0.0716		0.122		2.2

Permit Number:	2069-A		2069F-4		2069G-2		2069I-3		2069-K		Regulatory
Station:	WW001		WW006		WW007		WW008		WW011		Limit
Date Collected:	3/9/2005		3/9/2005		3/9/2005		3/9/2005		3/9/2005		COA
Sample ID:	066900		066901		066902		066903		066904		(mg/L)
Analyte											
Aluminum	0.0842	J	0.176		0.98		0.423		0.144		900
Arsenic	0.0128		0.00787		0.0038	J	0.0107		0.0101		0.051
Boron	0.178		0.207		0.0277	J	0.132		0.15		NE
Cadmium	0.000406	J	0.000386	U	0.000386	U	0.000386	U	0.000386	U	0.5
Chromium	0.00275	J	0.00112	J	0.00205	J	0.00288	J	0.00415	J	4.1
Copper	0.0352		0.0232		0.00277	J	0.0148		0.0448		5.3
Fluoride	0.624		0.453		2.33		2.68		0.213		36
Lead	0.00266	U	0.00266	U	0.00266	U	0.00266	U	0.00266	U	1
Molybdenum	0.219		0.05		0.0109		0.0708		0.693		2
Nickel	0.00514	B	0.0027	BJ	0.00404	BJ	0.00495	BJ	0.00244	BJ	2
Selenium	0.00338	U	0.00359	J	0.00338	U	0.00338	U	0.00338	U	0.46
Silver	0.00118	U	0.00118	U	0.00118	U	0.00118	U	0.00775		5
Zinc	0.057		0.0512		0.00524	J	0.0559		0.0828		2.2

Permit Number:	2069-A		2069F-4		2069G-2		2069I-3		2069-K		Regulatory
Station:	WW001		WW006		WW007		WW008		WW011		Limit
Date Collected:	--		3/8/2005		3/8/2005		3/8/2005		--		COA
Sample ID:	--		066905		066906		066907		--		(mg/L)
Analyte											
Cyanide, Total	--		0.0096675	B	0.0026075	BU	0.0036325	BJ	--		0.45

NOTES: COA = City of Albuquerque
J = Estimated value, the analyte concentration fell above the effective (MDL) minimum detection limit and below the effective (PQL) practical quantitation limit.
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.
B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).

This page intentionally left blank.

TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, March 2005
(All Results in picocuries per liter [pCi/L] unless otherwise noted.)

Permit Number:	2069-A			2069F-4			2069I-3			2069-K			Regulatory
Station:	WW001			WW006			WW008			WW011			Sewer Release
Date Collected:	3/8/2005			3/8/2005			3/8/2005			3/8/2005			Limits*
Sample ID:	066895			066896			066897			066898			(Monthly Avg)
Analyte	Activity		MDA	Activity		MDA	Activity		MDA	Activity		MDA	
Actinium-228	8.92 ± 7.33	U	6.45	2.45 ± 11.8	U	6.1	6.53 ± 7.02	U	6.14	4.54 ± 15	U	5.55	300,000
Gross Alpha	3.61 ± 2.03		1.49	1.65 ± 1.37	U	0.986	2.63 ± 1.24		0.87	1.7 ± 1.02		0.609	NE
Americium-241	-4.39 ± 8.31	U	6.37	8.23 ± 10.9	U	6.53	-8.69 ± 10.8	U	8.92	-10.9 ± 12.5	U	9.4	200
Antimony-124	-1.84 ± 1.97	U	1.62	-1.41 ± 1.94	U	1.57	0.0585 ± 2.12	U	1.83	-0.166 ± 1.79	U	1.5	70,000
Antimony-125	-0.508 ± 4.64	U	3.85	-0.447 ± 4.04	U	3.46	-1.21 ± 5.13	U	4.23	4.42 ± 4.17	U	3.72	300,000
Barium-133	1.31 ± 2.31	U	1.77	-0.341 ± 2.08	U	1.67	-4.87 ± 2.55	U	1.94	-1.49 ± 1.97	U	1.65	200,000
Beryllium-7	16.2 ± 16.6	U	12.9	-4.18 ± 14.4	U	12.2	14.6 ± 17.6	U	15.1	-16.4 ± 14.4	U	11.6	6,000,000
Gross Beta	17.7 ± 2.55		1.54	21.7 ± 2.48		1.34	6.65 ± 1.11		0.683	17.7 ± 1.49		0.711	NE
Bismuth-211	3.28 ± 23.2	U	8.55	2.53 ± 9.8	U	8.03	20.7 ± 13.2	U	10.4	11.9 ± 9.18	U	8.26	NE
Bismuth-212	11.8 ± 13.1	U	11.8	4.47 ± 12.7	U	10.8	26 ± 17.9	X	12.2	-6.92 ± 12.9	U	10.3	70,000
Bismuth-214	6.66 ± 3.81	U	3.46	1.25 ± 7.49	U	2.61	10.5 ± 4.25	X	3.89	6.33 ± 3.55	U	3.17	3,000,000
Cadmium-109	9.41 ± 32.4	U	28	-4.06 ± 32.3	U	27.9	14.5 ± 49.2	U	37.2	23.6 ± 51.1	U	32	60,000
Cerium-139	0.331 ± 1.39	U	1.16	-1.47 ± 1.39	U	1.13	-0.651 ± 1.68	U	1.35	-0.665 ± 1.36	U	1.12	700,000
Cerium-141	-1.94 ± 3.26	U	2.36	1.15 ± 2.88	U	2.47	3.24 ± 3.53	U	2.97	1.9 ± 2.81	U	2.4	300,000
Cerium-144	-0.435 ± 9.67	U	8.08	-9.57 ± 9.86	U	8.09	-8.78 ± 11.8	U	9.47	-3.1 ± 9.27	U	7.71	30,000
Cesium-134	0.0282 ± 1.93	U	1.62	0.423 ± 1.78	U	1.49	0.858 ± 2.03	U	1.75	0.119 ± 1.76	U	1.45	9,000
Cesium-137	0.394 ± 1.78	U	1.54	1.03 ± 1.66	U	1.44	2.08 ± 1.93	U	1.73	1.59 ± 1.54	U	1.36	10,000
Chromium-51	1.34 ± 17.2	U	14.7	2.79 ± 17.2	U	14.1	-9.9 ± 20.6	U	17.2	-10.5 ± 17.8	U	13.9	5,000,000
Cobalt-57	-0.916 ± 1.21	U	0.994	-0.518 ± 1.2	U	1.02	0.289 ± 1.52	U	1.26	0.611 ± 1.21	U	1.03	600,000
Cobalt-60	1.57 ± 1.93	U	1.73	-0.243 ± 1.8	U	1.49	0.715 ± 2.04	U	1.77	0.388 ± 1.78	U	1.52	30,000
Europium-152	0.802 ± 4.82	U	4.11	0.355 ± 4.75	U	3.87	0.459 ± 10.5	U	4.44	-2.6 ± 4.44	U	3.75	100,000
Europium-154	2.24 ± 5.37	U	4.67	0.989 ± 4.47	U	3.85	1.54 ± 5.49	U	4.77	0.871 ± 4.73	U	4.04	70,000
Iron-59	-2.34 ± 3.83	U	3.12	3.61 ± 5.43	U	3.35	-3.75 ± 4.4	U	3.39	1.49 ± 3.49	U	3.06	100,000
Lead-211	-9.51 ± 45	U	37	-6.59 ± 40.5	U	34.6	-7.42 ± 48.8	U	40.3	19.9 ± 41.6	U	34.8	2,000,000
Lead-212	1.75 ± 6.62	U	2.9	2.93 ± 5.83	U	2.61	1.96 ± 8.29	U	3.27	4.49 ± 6.12	U	2.49	20,000
Lead-214	1.14 ± 8.07	U	3.26	1.34 ± 3.43	U	2.83	9.96 ± 4.16	X	3.7	4.22 ± 3.23	U	2.9	1,000,000
Manganese-54	1.54 ± 1.78	U	1.56	1.61 ± 1.75	U	1.38	0.0727 ± 1.95	U	1.64	0.261 ± 1.67	U	1.39	300,000
Mercury-203	-1.3 ± 1.88	U	1.58	-0.0677 ±	U	1.58	-0.386 ± 2.26	U	1.92	-1.27 ± 1.77	U	1.4	300,000
Neptunium-237	-1.12 ± 9.8	U	8.35	-4.47 ± 9.83	U	8.37	-12.5 ± 13.8	U	11.1	8.44 ± 12.9	U	10.1	300,000
Neptunium-239	-1.04 ± 9.03	U	7.58	-12.3 ± 9.16	U	7.51	-0.21 ± 11.3	U	9.34	6.01 ± 9.19	U	7.91	300,000
Niobium-95	1.98 ± 2.15	U	1.9	1.61 ± 1.95	U	1.7	1.9 ± 2.27	U	2.01	0.766 ± 2.03	U	1.72	300,000
Potassium-40	24.2 ± 60.1	U	15	49 ± 47.7		13.5	38.8 ± 46.2	X	14.4	89.4 ± 43.6		13.5	40,000
Protactinium-231	68 ± 75.7	U	66.4	-30.2 ± 74.9	U	60.4	32.7 ± 86.4	U	74.4	6.8 ± 70.4	U	57.5	60

See notes at end of table.

TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, March 2005 *(concluded)*
(All Results in picocuries per liter [pCi/L] unless otherwise noted.)

Permit Number:	2069-A			2069F-4			2069I-3			2069-K			Regulatory
Station:	WW001			WW006			WW008			WW011			Sewer Release
Date Collected:	3/8/2005			3/8/2005			3/8/2005			3/8/2005			Limits*
Sample ID:	066895			066896			066897			066898			(Monthly Avg)
Analyte	Activity		MDA	Activity		MDA	Activity		MDA	Activity		MDA	
Protactinium-233	-0.299 ± 3.18	U	2.7	-0.814 ± 3.13	U	2.53	2.16 ± 3.76	U	3.25	1.03 ± 3.22	U	2.64	200,000
Protactinium-234	-2.18 ± 14.8	U	12.1	-6.11 ± 13.9	U	11	-8.89 ± 14.9	U	11.9	-0.131 ± 11.9	U	10.2	300,000
Radium-223	-8.85 ± 31.6	U	26.5	-4.05 ± 31.9	U	25.9	36.3 ± 37	U	31.9	-8.1 ± 31.9	U	25.4	1,000
Radium-224	58.3 ± 33.4	X	27.3	12.1 ± 33.9	U	25.5	32.3 ± 39.6	U	31	39.7 ± 34	U	26	2,000
Radium-226	6.66 ± 3.81	U	3.46	1.25 ± 7.49	U	3.24	10.5 ± 4.25	X	3.89	6.33 ± 3.55	U	3.17	600
Radium-228	8.92 ± 7.33	U	6.45	2.45 ± 11.8	U	6.1	6.53 ± 7.02	U	6.14	4.54 ± 15	U	5.55	600
Radon-219	11.6 ± 21.4	U	16.6	0.566 ± 17.9	U	15.5	-22.9 ± 22.5	U	17.7	5.63 ± 17.4	U	15.1	NE
Rhodium-106	-3.49 ± 15.5	U	13.1	-9.89 ± 14.4	U	11.6	3.28 ± 16.3	U	14.1	-10.4 ± 14.8	U	11.9	1,000,000
Ruthenium-103	0.635 ± 2.03	U	1.7	-0.116 ± 1.92	U	1.63	-1.84 ± 2.29	U	1.8	2.82 ± 2.56	U	1.52	300,000
Ruthenium-106	-2.43 ± 15.4	U	13.1	-1.06 ± 13.8	U	11.6	8.25 ± 16.3	U	14.3	-14.4 ± 14.8	U	11.6	30,000
Selenium-75	1.49 ± 2.08	U	1.83	0.0151 ± 2	U	1.65	2.32 ± 2.42	U	2.13	-0.243 ± 2.01	U	1.63	70,000
Sodium-22	0.801 ± 1.92	U	1.67	0.341 ± 1.6	U	1.37	0.537 ± 1.96	U	1.7	0.336 ± 1.69	U	1.45	20,000
Strontium-85	6.57 ± 2.35	X	1.92	-12.9 ± 2.83	U	1.95	-20.7 ± 3.74	U	2.32	-4.27 ± 2.71	U	2.18	400,000
Thallium-208	3 ± 1.84	U	1.68	2.21 ± 1.77	U	1.58	0.631 ± 3.66	U	2.03	0.495 ± 3.8	U	1.63	NE
Thorium-227	2.41 ± 18.4	U	16	-18.3 ± 18.5	U	14.5	-27.2 ± 21.5	U	17.3	-11.5 ± 18.7	U	14.9	20,000
Thorium-231	-0.775 ± 8.27	U	7.09	8.55 ± 8.49	U	7.23	0.534 ± 9.98	U	8.54	-1.4 ± 8.67	U	7.02	500,000
Thorium-232	1.72 ± 6.53	U	2.86	2.89 ± 5.75	U	2.13	1.94 ± 8.18	U	3.22	4.43 ± 6.03	X	2.07	300
Thorium-234	38.6 ± 123	U	60	194 ± 74.3	X	61.3	411 ± 120	X	89.3	233 ± 109	X	84.6	50,000
Tin-113	-1.1 ± 2.15	U	1.76	1.67 ± 1.91	U	1.71	-0.0819 ±	U	1.88	0.0591 ± 1.93	U	1.66	300,000
Tritium	-103 ± 129	U	113	-34.9 ± 135	U	115	-69.5 ± 132	U	114	0 ± 136	U	114	10,000,000
Uranium-235	5.23 ± 10.1	U	8.51	10.8 ± 10.1	U	8.7	20.6 ± 12.8	U	10.6	8.15 ± 10	U	8.52	3,000
Uranium-238	38.6 ± 123	U	50.7	194 ± 74.3	X	61.3	411 ± 120	X	89.3	233 ± 109	X	84.6	3,000
Yttrium-88	0.257 ± 2.1	U	1.8	0.881 ± 1.83	U	1.65	-0.878 ± 2.17	U	1.73	1.08 ± 1.81	U	1.64	100,000
Zinc-65	-1.02 ± 3.93	U	3.3	2.08 ± 4.02	U	3.13	1.12 ± 4.63	U	3.36	-1.64 ± 3.48	U	2.85	50,000
Zirconium-95	1.92 ± 3.18	U	2.78	0.326 ± 4.83	U	2.64	0.173 ± 3.44	U	2.92	2.58 ± 3.11	U	2.7	20,000

NOTES: U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.
X = Presumptive evidence analyte is not present.
NE = not established.
MDA = minimum detectable activity.
* = The monthly average concentration values for release of sanitary sewage were derived by taking the most restrictive occupational stochastic oral ingestion annual limits on intake (ALT) for a reference man.

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volatile Organic Compounds, March 2005
(All Results in micrograms per liter [ug/L] unless otherwise noted.)

Permit Number:	2069-A		2069F-4		2069I-3		2069-K	
Station:	WW001		WW006		WW008		WW011	
Date Collected:	3/8/2005		3/8/2005		3/8/2005		3/8/2005	
Sample ID:	066895		066896		066898		066899	
Analyte								
1,2,4-Trichlorobenzene	0.717	U	0.683	U	0.71	U	0.348	U
2,4,6-Trichlorophenol	0.394	U	0.375	U	0.39	U	0.191	U
2,4-Dichlorophenol	0.475	U	0.452	U	0.47	U	0.23	U
2,4-Dimethylphenol	0.475	U	0.452	U	0.47	U	0.23	U
2,4-Dinitrophenol	5.05	U	4.81	U	5	U	2.45	U
2,4-Dinitrotoluene	0.707	U	0.673	U	0.7	U	0.343	U
2,6-Dinitrotoluene	0.505	U	0.481	U	0.5	U	0.245	U
2-Chloronaphthalene	0.404	U	0.385	U	0.4	U	0.196	U
2-Chlorophenol	0.414	U	0.394	U	0.41	U	0.201	U
2-Methyl-4,6-dinitrophenol	1.01	U	0.962	U	1	U	0.49	U
2-Nitrophenol	0.596	U	0.567	U	0.59	U	0.289	U
4-Chloro-3-methylphenol	0.697	U	0.663	U	0.69	U	0.338	U
4-Nitrophenol	5.05	U	4.81	U	5	U	2.45	U
Acenaphthene	0.505	U	0.481	U	0.5	U	0.245	U
Acenaphthylene	0.505	U	0.481	U	0.5	U	0.245	U
Anthracene	0.505	U	0.481	U	0.5	U	0.245	U
Benzo(a)anthracene	0.505	U	0.481	U	0.5	U	0.245	U
Benzo(a)pyrene	0.505	U	0.481	U	0.5	U	0.245	U
Benzo(b)fluoranthene	0.505	U	0.481	U	0.5	U	0.245	U
Benzo(ghi)perylene	0.505	U	0.481	U	0.5	U	0.245	U
Benzo(k)fluoranthene	0.505	U	0.481	U	0.5	U	0.245	U
bis(2- Chloroethoxy)methane	0.485	U	0.462	U	0.48	U	0.235	U
bis(2-Chloroethyl) ether	1.38	U	1.32	U	1.37	U	0.672	U
bis(2-Chloroisopropyl)ether	0.808	U	0.769	U	0.8	U	0.392	U
bis(2-Ethylhexyl)phthalate	4.15	J	10.1		1.3	U	1.04	J
Chrysene	0.505	U	0.481	U	0.5	U	0.245	U
Dibenzo(a,h)anthracene	0.505	U	0.481	U	0.5	U	0.245	U
Dibenzofuran	0.424	U	0.404	U	0.42	U	0.206	U
Diethylphthalate	4.34	J	5.86	J	2.08	J	0.979	J
Di-n-butylphthalate	1.01	U	0.962	U	1	U	0.49	U
Di-n-octylphthalate	0.879	U	0.837	U	0.87	U	0.426	U
Fluoranthene	0.505	U	0.481	U	0.5	U	0.245	U
Fluorene	0.505	U	0.481	U	0.5	U	0.245	U
Hexachlorobenzene	0.657	U	0.625	U	0.65	U	0.319	U
Hexachlorobutadiene	0.323	U	0.308	U	0.32	U	0.157	U
Hexachlorocyclopentadiene	1.01	U	0.962	U	1	U	0.49	U
Hexachloroethane	0.434	U	0.413	U	0.43	U	0.211	U
Indeno(1,2,3-cd)pyrene	0.505	U	0.481	U	0.5	U	0.245	U
Isophorone	0.596	U	0.567	U	0.59	U	0.289	U
Naphthalene	0.111	U	2.72		0.11	U	0.0539	U
Nitrobenzene	0.636	U	0.606	U	0.63	U	0.309	U
N-Nitrosodipropylamine	0.758	U	0.721	U	0.75	U	0.368	U
Pentachlorophenol	5.05	U	4.81	U	5	U	2.45	U
Phenanthrene	0.505	U	0.481	U	0.5	U	0.245	U
Phenol	0.303	U	2.01	J	0.3	U	0.147	U
Pyrene	0.505	U	0.481	U	0.5	U	0.245	U

NOTES: J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

This page intentionally left blank.

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, March 2005
(All Results in micrograms per liter [ug/L] unless otherwise noted.)

Permit Number:	**2069-A**		**2069F-4**		**2069I-3**		**2069-K**	
Station:	**WW001**		**WW006**		**WW008**		**WW011**	
Date Collected:	**3/8/2005**		**3/8/2005**		**3/8/2005**		**3/8/2005**	
Sample ID:	**066895**		**066896**		**066898**		**066899**	
Analyte								
1,1,1-Trichloroethane	0.34	U	0.34	U	0.34	U	0.34	U
1,1,2,2-Tetrachloroethane	0.49	U	0.49	U	0.49	U	0.49	U
1,1,2-Trichloroethane	0.44	U	0.44	U	0.44	U	0.44	U
1,1-Dichloroethane	0.41	U	0.41	U	0.41	U	0.41	U
1,1-Dichloroethylene	0.41	U	0.41	U	0.41	U	0.41	U
1,2-Dichlorobenzene	0.414	U	0.394	U	0.41	U	0.201	U
1,2-Dichloroethane	0.29	U	0.29	U	0.29	U	0.29	U
1,2-Dichloropropane	0.25	U	0.25	U	0.25	U	0.25	U
1,3-Dichlorobenzene	0.414	U	0.394	U	0.41	U	0.201	U
1,4-Dichlorobenzene	0.313	U	0.851	J	0.31	U	0.152	U
2,4,5-Trichlorophenol	0.98	U	0.933	U	0.97	U	0.475	U
2-Butanone	2.31	U	3.71	J	2.31	U	2.56	J
2-Hexanone	1.45	U	1.45	U	1.45	U	1.45	U
2-Methylnaphthalene	0.505	U	0.481	U	0.5	U	0.245	U
3,3'-Dichlorobenzidine	0.515	U	0.49	U	0.51	U	0.25	U
4-Bromophenylphenylether	1.23	U	1.17	U	1.22	U	0.598	U
4-Chloroaniline	1.11	U	1.06	U	1.1	U	0.539	U
4-Chlorophenylphenylether	0.848	U	0.808	U	0.84	U	0.412	U
4-Methyl-2-pentanone	1.78	U	1.78	U	1.78	U	1.78	U
Acetone	77.7		58.9		156		74.7	
Benzene	0.33	U	0.33	U	0.33	U	0.33	U
Bromodichloromethane	0.38	U	0.38	U	0.38	U	0.38	U
Bromoform	0.5	U	0.5	U	0.5	U	0.5	U
Bromomethane	0.5	U	0.5	U	0.5	U	0.5	U
Butylbenzylphthalate	0.687	U	0.654	U	1.99	J	0.333	U
Carbazole	0.505	U	0.481	U	0.5	U	0.245	U
Carbon disulfide	1.91	U	1.91	U	1.91	U	1.91	U
Carbon tetrachloride	0.29	U	0.29	U	0.29	U	0.29	U
Chlorobenzene	0.32	U	0.32	U	0.32	U	0.32	U
Chloroethane	0.5	U	0.5	U	0.5	U	0.5	U
Chloroform	0.36	U	0.495	J	0.36	U	0.77	J
Chloromethane	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethylene	0.3	U	0.3	U	0.3	U	0.3	U
cis-1,3-Dichloropropylene	0.3	U	0.3	U	0.3	U	0.3	U
Dibromochloromethane	0.29	U	0.29	U	0.29	U	0.29	U
Dimethylphthalate	0.676	J	0.51	U	0.53	U	0.26	U
Diphenylamine	0.798	U	0.76	U	0.79	U	0.387	U
Ethylbenzene	0.21	U	0.21	U	0.21	U	0.21	U
m,p-Cresol	0.596	U	20		8.86	J	0.289	U
Methylene chloride	3.3	U	3.3	U	3.3	U	3.3	U
m-Nitroaniline	1.01	U	0.962	U	1	U	0.49	U
o-Cresol	1.17	J	0.433	U	0.45	U	0.221	U
o-Nitroaniline	0.646	U	0.615	U	0.64	U	0.314	U
p-Nitroaniline	0.677	U	0.644	U	0.67	U	0.328	U
Styrene	0.25	U	0.25	U	0.25	U	0.25	U

See notes at end of table.

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, March 2005 (concluded)
(All Results in micrograms per liter [ug/L] unless otherwise noted.)

Permit Number:	**2069-A**		**2069F-4**		**2069I-3**		**2069-K**	
Station:	**WW001**		**WW006**		**WW008**		**WW011**	
Date Collected:	**3/8/2005**		**3/8/2005**		**3/8/2005**		**3/8/2005**	
Sample ID:	**066895**		**066896**		**066898**		**066899**	
Analyte								
Tetrachloroethylene	0.33	U	0.33	U	0.33	U	0.33	U
Toluene	0.39	U	0.39	U	0.39	U	2.8	
trans-1,2-Dichloroethylene	0.37	U	0.37	U	0.37	U	0.37	U
trans-1,3- Dichloropropylene	0.29	U	0.29	U	0.29	U	0.29	U
Trichloroethylene	0.36	U	0.36	U	0.36	U	0.36	U
Vinyl acetate	1.32	U	1.32	U	1.32	U	1.32	U
Vinyl chloride	0.55	U	0.55	U	0.55	U	0.55	U
Xylenes (total)	0.25	U	0.25	U	0.25	U	0.25	U

NOTES: U=The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
SNL/NM uses the City of Albuquerque's value of 3.2 mg/L as the standard (that value has not been exceeded). This value is derived from the summation of all values greater than 0.01 mg/L for the list of toxic organics as developed by the EPA for each National Categorical Pretreatment Standard. For non-categorical users, the summation of all values above 0.01 mg/L of those listed in 40 CFR 122, Appendix D, Table II, or as directed by the Industrial Waste Engineer. Based on the Sewer Use and Wastewater Control Table, this value should never exceed 3.2 mg/L.

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Metals) Analyses, CY 2005
(All Results in milligrams per liter [mg/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069-A	WW001	Aluminum	4	0.151	0.06	0.084	0.218	900
		Arsenic	4	0.019	0.00	0.013	0.022	0.051
		Cadmium	4	0.001	0.00	0.000	0.002	0.5
		Chromium	4	0.003	0.00	0.002	0.005	4.1
		Copper	4	0.035	0.00	0.034	0.035	5.3
		Fluoride	4	0.791	0.25	0.530	1.020	36
		Lead	4	0.003	0.00	0.003	0.003	1
		Molybdenum	4	0.255	0.07	0.171	0.333	2
		Nickel	4	0.003	0.00	0.001	0.005	2
		Selenium	4	0.008	0.01	0.003	0.017	0.46
		Silver	4	0.001	0.00	0.001	0.001	5
		Zinc	4	0.081	0.02	0.057	0.100	2.2
2069F-4	WW006	Aluminum	4	0.464	0.31	0.176	0.900	900
		Arsenic	4	0.013	0.01	0.006	0.029	0.051
		Cadmium	4	0.001	0.00	0.000	0.001	0.5
		Chromium	4	0.003	0.00	0.001	0.007	4.1
		Copper	4	0.022	0.01	0.007	0.033	5.3
		Fluoride	4	0.608	0.17	0.453	0.771	36
		Lead	4	0.003	0.00	0.003	0.005	1
		Molybdenum	4	0.060	0.04	0.034	0.115	2
		Nickel	4	0.003	0.00	0.002	0.004	2
		Selenium	4	0.012	0.01	0.004	0.034	0.46
		Silver	4	0.006	0.01	0.001	0.021	5
		Zinc	4	0.064	0.05	0.002	0.119	2.2
2069G-2	WW007	Aluminum	4	0.636	0.33	0.187	0.980	900
		Arsenic	4	0.007	0.01	0.002	0.017	0.051
		Cadmium	4	0.001	0.00	0.000	0.001	0.5
		Chromium	4	0.003	0.00	0.002	0.004	4.1
		Copper	4	0.004	0.00	0.002	0.010	5.3
		Fluoride	4	2.158	0.22	1.830	2.330	36
		Lead	4	0.003	0.00	0.003	0.003	1
		Molybdenum	4	0.038	0.05	0.011	0.120	2
		Nickel	4	0.002	0.00	0.001	0.004	2
		Selenium	4	0.005	0.00	0.003	0.006	0.46
		Silver	4	0.003	0.00	0.001	0.006	5
		Zinc	4	0.013	0.01	0.004	0.035	2.2
2069I-3	WW008	Aluminum	4	0.450	0.20	0.315	0.743	900
		Arsenic	4	0.013	0.00	0.011	0.016	0.051
		Cadmium	4	0.001	0.00	0.000	0.001	0.5
		Chromium	4	0.004	0.00	0.003	0.007	4.1
		Copper	4	0.015	0.00	0.013	0.017	5.3
		Fluoride	4	2.938	0.39	2.550	3.390	36
		Lead	4	0.003	0.00	0.003	0.003	1
		Molybdenum	4	0.102	0.05	0.062	0.160	2
		Nickel	4	0.003	0.00	0.001	0.005	2
		Selenium	4	0.008	0.01	0.003	0.017	0.46
		Silver	4	0.001	0.00	0.001	0.002	5
		Zinc	4	0.062	0.01	0.054	0.072	2.2

See notes at end of table.

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Metals) Analyses, CY 2005 (concluded)

(All Results in milligrams per liter [mg/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069-K	WW011	Aluminum	4	0.132	0.06	0.045	0.178	900
		Arsenic	4	0.014	0.00	0.010	0.017	0.051
		Cadmium	4	0.001	0.00	0.000	0.001	0.5
		Chromium	4	0.004	0.00	0.002	0.007	4.1
		Copper	4	0.031	0.01	0.017	0.045	5.3
		Fluoride	4	0.439	0.18	0.213	0.631	36
		Lead	4	0.002	0.00	0.001	0.003	1
		Molybdenum	3	0.885	0.82	0.182	1.780	2
		Nickel	4	0.003	0.00	0.002	0.004	2
		Selenium	4	0.012	0.01	0.003	0.034	0.46
		Silver	4	0.003	0.00	0.000	0.008	5
		Zinc	4	0.099	0.04	0.054	0.136	2.2

NOTES: COA = City of Albuquerque
NE = Not established
Std Dev = Standard Deviation

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2005
(All Results in picocuries per liter [pci/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA*
2069-A	WW001	Actinium-228	2	7.55	1.94	6.18	8.92	300,000
		Americium-241	2	-2.33	2.92	-4.39	-0.263	200
		Antimony-124	2	-1.56	0.40	-1.84	-1.27	70,000
		Antimony-125	2	-0.49	0.02	-0.508	-0.481	300,000
		Barium-133	2	0.63	0.96	-0.0424	1.31	200,000
		Beryllium-7	2	9.66	9.25	3.12	16.2	6,000,000
		Bismuth-211	2	17.49	20.10	3.28	31.7	NE
		Bismuth-212	2	15.20	4.81	11.8	18.6	70,000
		Bismuth-214	2	9.33	3.78	6.66	12	3,000,000
		Cadmium-109	2	9.96	0.77	9.41	10.5	60,000
		Cerium-139	2	0.21	0.17	0.0851	0.331	700,000
		Cerium-141	2	1.38	4.69	-1.94	4.69	300,000
		Cerium-144	2	0.65	1.53	-0.435	1.73	30,000
		Cesium-134	2	0.30	0.38	0.0282	0.563	9,000
		Cesium-137	2	0.58	0.26	0.394	0.757	10,000
		Chromium-51	2	-8.93	14.52	-19.2	1.34	5,000,000
		Cobalt-57	2	-0.44	0.68	-0.916	0.044	600,000
		Cobalt-60	2	0.53	1.47	-0.51	1.57	30,000
		Europium-152	2	-0.99	2.54	-2.79	0.802	100,000
		Europium-154	2	2.00	0.34	1.76	2.24	70,000
		Gross Alpha	2	4.60	1.39	3.61	5.58	NE
		Gross Beta	2	25.05	10.39	17.7	32.4	NE
		Iron-59	2	-0.19	3.04	-2.34	1.96	100,000
		Lead-211	2	-31.36	30.89	-53.2	-9.51	2,000,000
		Lead-212	2	5.82	5.75	1.75	9.88	20,000
		Lead-214	2	6.07	6.97	1.14	11	1,000,000
		Manganese-54	2	0.68	1.22	-0.19	1.54	300,000
		Mercury-203	2	0.83	3.01	-1.3	2.95	300,000
		Neptunium-237	2	2.50	5.11	-1.12	6.11	300,000
		Neptunium-239	2	-1.50	0.64	-1.95	-1.04	300,000
		Niobium-95	2	2.15	0.23	1.98	2.31	300,000
		Potassium-40	2	35.65	16.19	24.2	47.1	40,000
		Protactinium-231	2	25.05	60.74	-17.9	68	60
		Protactinium-233	2	0.88	1.67	-0.299	2.06	200,000
		Protactinium-234	2	3.14	7.52	-2.18	8.45	300,000
		Radium-223	2	-21.73	18.21	-34.6	-8.85	1,000
		Radium-224	2	-3.95	88.03	-66.2	58.3	2,000
		Radium-226	2	9.33	3.78	6.66	12	600
		Radium-228	2	7.55	1.94	6.18	8.92	600
		Radon-219	2	15.70	5.80	11.6	19.8	NE
		Rhodium-106	2	1.52	7.08	-3.49	6.52	1,000,000
		Ruthenium-103	2	0.60	0.05	0.564	0.635	300,000
		Ruthenium-106	2	0.92	4.73	-2.43	4.26	30,000
		Selenium-75	2	1.17	0.45	0.849	1.49	70,000
		Sodium-22	2	0.72	0.11	0.646	0.801	20,000
		Strontium-85	2	-6.82	18.93	-20.2	6.57	400,000
		Thallium-208	2	3.21	0.29	3	3.41	NE
		Thorium-227	2	1.42	1.40	0.437	2.41	20,000
		Thorium-231	2	3.65	6.25	-0.775	8.07	500,000

See notes at end of table.

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2005 (continued)
(All Results in picocuries per liter [pci/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA*
2069-A	WW001	Thorium-232	2	5.69	5.61	1.72	9.65	300
		Thorium-234	2	68.45	42.21	38.6	98.3	50,000
		Tin-113	2	-0.32	1.10	-1.1	0.454	300,000
		Tritium	2	-106.50	4.95	-110	-103	10,000,000
		Uranium-235	2	11.97	9.52	5.23	18.7	3,000
		Uranium-238	2	68.45	42.21	38.6	98.3	3,000
		Yttrium-88	2	-0.16	0.59	-0.583	0.257	100,000
		Zinc-65	2	-0.56	0.64	-1.02	-0.108	50,000
		Zirconium-95	2	0.66	1.78	-0.599	1.92	200,000
2069F-4	WW006	Actinium-228	2	12.08	13.61	2.45	21.7	300,000
		Americium-241	2	3.75	6.33	-0.721	8.23	200
		Antimony-124	2	-0.53	1.24	-1.41	0.349	70,000
		Antimony-125	2	-0.77	0.45	-1.09	-0.447	300,000
		Barium-133	2	1.40	2.46	-0.341	3.14	200,000
		Beryllium-7	2	-0.77	4.83	-4.18	2.65	6,000,000
		Bismuth-211	2	12.77	14.47	2.53	23	NE
		Bismuth-212	2	5.91	2.03	4.47	7.34	70,000
		Bismuth-214	2	7.08	8.24	1.25	12.9	3,000,000
		Cadmium-109	2	10.12	20.05	-4.06	24.3	60,000
		Cerium-139	2	-0.81	0.93	-1.47	-0.158	700,000
		Cerium-141	2	1.02	0.18	0.895	1.15	300,000
		Cerium-144	2	-8.00	2.22	-9.57	-6.43	30,000
		Cesium-134	2	0.29	0.19	0.155	0.423	9,000
		Cesium-137	2	0.97	0.09	0.906	1.03	10,000
		Chromium-51	2	-7.46	14.49	-17.7	2.79	5,000,000
		Cobalt-57	2	0.13	0.91	-0.518	0.773	600,000
		Cobalt-60	2	0.16	0.57	-0.243	0.562	30,000
		Europium-152	2	-0.02	0.52	-0.386	0.355	100,000
		Europium-154	2	1.53	0.76	0.989	2.07	70,000
		Gross Alpha	2	3.37	2.43	1.65	5.09	NE
		Gross Beta	2	27.55	8.27	21.7	33.4	NE
		Iron-59	2	1.82	2.52	0.0392	3.61	100,000
		Lead-211	2	-4.79	2.55	-6.59	-2.99	2,000,000
		Lead-212	2	8.32	7.62	2.93	13.7	20,000
		Lead-214	2	4.68	4.72	1.34	8.01	1,000,000
		Manganese-54	2	0.67	1.32	-0.263	1.61	300,000
		Mercury-203	2	0.18	0.35	-0.0677	0.421	300,000
		Neptunium-237	2	1.29	8.14	-4.47	7.04	300,000
		Neptunium-239	2	-5.89	9.07	-12.3	0.52	300,000
		Niobium-95	2	2.29	0.95	1.61	2.96	300,000
		Potassium-40	2	57.65	12.23	49	66.3	40,000
		Protactinium-231	2	-30.25	0.07	-30.3	-30.2	60
		Protactinium-233	2	-0.56	0.36	-0.814	-0.311	200,000
		Protactinium-234	2	6.45	17.76	-6.11	19	300,000
		Radium-223	2	-4.80	1.06	-5.55	-4.05	1,000
		Radium-224	2	-42.45	77.15	-97	12.1	2,000
		Radium-226	2	7.08	8.24	1.25	12.9	600
		Radium-228	2	12.08	13.61	2.45	21.7	600
		Radon-219	2	-2.44	4.25	-5.45	0.566	NE
		Rhodium-106	2	-4.96	6.97	-9.89	-0.0393	1,000,000

See notes at end of table.

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2005 (continued)
(All Results in picocuries per liter [pci/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA*
2069F-4	WW006	Ruthenium-103	2	3.33	4.88	-0.116	6.78	300,000
		Ruthenium-106	2	-1.55	0.69	-2.03	-1.06	30,000
		Selenium-75	2	1.34	1.87	0.0151	2.66	70,000
		Sodium-22	2	0.53	0.27	0.341	0.724	20,000
		Strontium-85	2	-4.45	11.95	-12.9	4	400,000
		Thallium-208	2	2.80	0.83	2.21	3.39	NE
		Thorium-227	2	-17.25	1.48	-18.3	-16.2	20,000
		Thorium-231	2	7.41	1.61	6.27	8.55	500,000
		Thorium-232	2	8.10	7.36	2.89	13.3	300
		Thorium-234	2	113.55	113.77	33.1	194	50,000
		Tin-113	2	0.70	1.37	-0.27	1.67	300,000
		Tritium	2	-76.95	59.47	-119	-34.9	10,000,000
		Uranium-235	2	7.39	4.82	3.98	10.8	3,000
		Uranium-238	2	113.55	113.77	33.1	194	3,000
		Yttrium-88	2	0.10	1.11	-0.688	0.881	100,000
		Zinc-65	2	1.53	0.78	0.983	2.08	50,000
		Zirconium-95	2	-0.31	0.90	-0.952	0.326	200,000
2069I-3	WW008	Actinium-228	2	9.47	4.15	6.53	12.4	300,000
		Americium-241	2	-2.58	8.65	-8.69	3.54	200
		Antimony-124	2	0.58	0.74	0.0585	1.1	70,000
		Antimony-125	2	0.43	2.32	-1.21	2.07	300,000
		Barium-133	2	-4.17	0.99	-4.87	-3.47	200,000
		Beryllium-7	2	7.55	9.97	0.497	14.6	6,000,000
		Bismuth-211	2	22.60	2.69	20.7	24.5	NE
		Bismuth-212	2	21.15	6.86	16.3	26	70,000
		Bismuth-214	2	5.27	7.40	0.0318	10.5	3,000,000
		Cadmium-109	2	-2.40	23.90	-19.3	14.5	60,000
		Cerium-139	2	-0.44	0.30	-0.651	-0.223	700,000
		Cerium-141	2	4.33	1.53	3.24	5.41	300,000
		Cerium-144	2	-6.11	3.78	-8.78	-3.43	30,000
		Cesium-134	2	0.28	0.82	-0.301	0.858	9,000
		Cesium-137	2	0.63	2.04	-0.811	2.08	10,000
		Chromium-51	2	0.90	15.27	-9.9	11.7	5,000,000
		Cobalt-57	2	0.72	0.61	0.289	1.15	600,000
		Cobalt-60	2	1.05	0.47	0.715	1.38	30,000
		Europium-152	2	-0.59	1.48	-1.63	0.459	100,000
		Europium-154	2	1.13	0.57	0.729	1.54	70,000
		Gross Alpha	2	3.03	0.56	2.63	3.42	NE
		Gross Beta	2	10.13	4.91	6.65	13.6	NE
		Iron-59	2	-3.37	0.54	-3.75	-2.99	100,000
		Lead-211	2	-3.84	5.06	-7.42	-0.262	2,000,000
		Lead-212	2	4.84	4.07	1.96	7.72	20,000
		Lead-214	2	9.97	0.01	9.96	9.98	1,000,000
		Manganese-54	2	0.39	0.45	0.0727	0.707	300,000
		Mercury-203	2	-0.59	0.29	-0.801	-0.386	300,000
		Neptunium-237	2	-7.89	6.53	-12.5	-3.27	300,000
		Neptunium-239	2	1.63	2.60	-0.21	3.46	300,000
		Niobium-95	2	0.49	1.99	-0.913	1.9	300,000
		Potassium-40	2	64.10	35.78	38.8	89.4	40,000
		Protactinium-231	2	14.47	25.78	-3.76	32.7	60
		Protactinium-233	2	0.39	2.50	-1.38	2.16	200,000

See notes at end of table.

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2005 (continued)
(All Results in picocuries per liter [pci/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA*
2069I-3	WW008	Protactinium-234	2	-6.98	2.70	-8.89	-5.07	300,000
		Radium-223	2	17.10	27.15	-2.1	36.3	1,000
		Radium-224	2	12.62	27.83	-7.06	32.3	2,000
		Radium-226	2	5.27	7.40	0.0318	10.5	600
		Radium-228	2	9.47	4.15	6.53	12.4	600
		Radon-219	2	-11.91	15.54	-22.9	-0.925	NE
		Rhodium-106	2	-2.10	7.60	-7.47	3.28	1,000,000
		Ruthenium-103	2	-0.40	2.04	-1.84	1.04	300,000
		Ruthenium-106	2	1.60	9.40	-5.05	8.25	30,000
		Selenium-75	2	1.49	1.17	0.667	2.32	70,000
		Sodium-22	2	0.40	0.20	0.256	0.537	20,000
		Strontium-85	2	-19.70	1.41	-20.7	-18.7	400,000
		Thallium-208	2	1.80	1.65	0.631	2.96	NE
		Thorium-227	2	-9.88	24.50	-27.2	7.45	20,000
		Thorium-231	2	-1.65	3.09	-3.83	0.534	500,000
		Thorium-232	2	4.70	3.90	1.94	7.45	300
		Thorium-234	2	265.50	205.77	120	411	50,000
		Tin-113	2	-0.06	0.03	-0.0819	-0.0334	300,000
		Tritium	2	-137.75	96.52	-206	-69.5	10,000,000
		Uranium-235	2	12.97	10.79	5.34	20.6	3,000
		Uranium-238	2	265.50	205.77	120	411	3,000
		Yttrium-88	2	-0.68	0.28	-0.878	-0.477	100,000
		Zinc-65	2	-1.49	3.68	-4.09	1.12	50,000
		Zirconium-95	2	-0.86	1.46	-1.89	0.173	200,000
2069-K	WW011	Actinium-228	2	7.52	4.21	4.54	10.5	300,000
		Americium-241	2	-4.33	9.29	-10.9	2.24	200
		Antimony-124	2	-2.33	3.06	-4.5	-0.166	70,000
		Antimony-125	2	0.70	5.27	-3.03	4.42	300,000
		Barium-133	2	-2.05	0.78	-2.6	-1.49	200,000
		Beryllium-7	2	-9.28	10.08	-16.4	-2.15	6,000,000
		Bismuth-211	2	18.95	9.97	11.9	26	NE
		Bismuth-212	2	1.46	11.84	-6.92	9.83	70,000
		Bismuth-214	2	7.93	2.26	6.33	9.52	3,000,000
		Cadmium-109	2	22.15	2.05	20.7	23.6	60,000
		Cerium-139	2	0.41	1.52	-0.665	1.48	700,000
		Cerium-141	2	1.51	0.55	1.12	1.9	300,000
		Cerium-144	2	3.17	8.87	-3.1	9.44	30,000
		Cesium-134	2	0.15	0.04	0.119	0.18	9,000
		Cesium-137	2	1.14	0.64	0.681	1.59	10,000
		Chromium-51	2	-0.64	13.94	-10.5	9.22	5,000,000
		Cobalt-57	2	0.77	0.23	0.611	0.93	600,000
		Cobalt-60	2	-0.38	1.08	-1.14	0.388	30,000
		Europium-152	2	-0.14	3.48	-2.6	2.32	100,000
		Europium-154	2	2.23	1.92	0.871	3.58	70,000
		Gross Alpha	2	2.90	1.70	1.7	4.1	NE
		Gross Beta	2	23.20	7.78	17.7	28.7	NE
		Iron-59	2	1.25	0.35	1	1.49	100,000
		Lead-211	2	18.05	2.62	16.2	19.9	2,000,000
		Lead-212	2	8.40	5.52	4.49	12.3	20,000
		Lead-214	2	6.47	3.17	4.22	8.71	1,000,000
		Manganese-54	2	-0.48	1.05	-1.22	0.261	300,000

See notes at end of table.

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2005 (concluded)
(All Results in picocuries per liter [pci/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA*
2069-K	WW011	Mercury-203	2	-0.66	0.86	-1.27	-0.0473	300,000
		Neptunium-237	2	7.95	0.69	7.46	8.44	300,000
		Neptunium-239	2	2.35	5.18	-1.32	6.01	300,000
		Niobium-95	2	0.84	0.11	0.766	0.922	300,000
		Potassium-40	2	62.30	38.33	35.2	89.4	40,000
		Protactinium-231	2	18.20	16.12	6.8	29.6	60
		Protactinium-233	2	-0.19	1.73	-1.41	1.03	200,000
		Protactinium-234	2	-3.26	4.42	-6.38	-0.131	300,000
		Radium-223	2	-14.25	8.70	-20.4	-8.1	1,000
		Radium-224	2	-20.65	85.35	-81	39.7	2,000
		Radium-226	2	7.93	2.26	6.33	9.52	600
		Radium-228	2	7.52	4.21	4.54	10.5	600
		Radon-219	2	9.52	5.49	5.63	13.4	NE
		Rhodium-106	2	-4.00	9.05	-10.4	2.4	1,000,000
		Ruthenium-103	2	0.13	3.81	-2.57	2.82	300,000
		Ruthenium-106	2	-5.81	12.15	-14.4	2.78	30,000
		Selenium-75	2	-0.32	0.10	-0.389	-0.243	70,000
		Sodium-22	2	0.81	0.67	0.336	1.28	20,000
		Strontium-85	2	-13.09	12.47	-21.9	-4.27	400,000
		Thallium-208	2	2.75	3.19	0.495	5	NE
		Thorium-227	2	6.05	24.82	-11.5	23.6	20,000
		Thorium-231	2	2.06	4.89	-1.4	5.52	500,000
		Thorium-232	2	8.22	5.35	4.43	12	300
		Thorium-234	2	129.00	147.08	25	233	50,000
		Tin-113	2	-0.75	1.14	-1.56	0.0591	300,000
		Tritium	2	-61.00	86.27	-122	0	10,000,000
		Uranium-235	1	0.00		0.000024	0.000024	3,000
		Uranium-235	2	10.53	3.36	8.15	12.9	3,000
		Uranium-238	1	0.00		0.00379	0.00379	100,000
		Uranium-238	2	129.00	147.08	25	233	50,000
		Yttrium-88	2	1.26	0.25	1.08	1.43	200,000
		Zinc-65	2	-2.12	0.67	-2.59	-1.64	NE
		Zirconium-95	2	2.11	0.66	1.64	2.58	200,000

NOTES: COA = City of Albuquerque
NE = Not established
Std Dev = Standard Deviation
* = The monthly average concentration values for release of sanitary sewage were derived by taking the most restrictive occupational stochastic oral ingestion annual limits on intake (ALT) for a reference man.

This page intentionally left blank.

TABLE A-7. Permitted Sanitary Outfalls, September 2005

(All results in milligrams per liter [mg/L] unless otherwise noted.)

Permit Number:	2069-A		2069F-4		2069G-2		2069I-3		Regulatory
Station:	WW001		WW006		WW007		WW008		Limit
Date Collected:	9/20/2005		9/20/2005		9/20/2005		9/20/2005		COA
Sample ID:	070004		070005		070006		070007		(mg/L)
Analyte									
Aluminum	0.218		0.326		0.679		0.319		900
Arsenic	0.0218		0.0286		0.006	U	0.0143	J	0.051
Cyanide, Total	--		0.002775	U	0.00359	U	0.0028575	U	0.45
Boron	0.201	B	0.228	B	0.0552	B	0.16	B	NE
Cadmium	0.00187	J	0.00105	J	0.001	U	0.001	U	0.5
Chromium	0.00509	B	0.0069	B	0.00226	BJ	0.00369	BJ	4.1
Copper	0.0352	B	0.0327	B	0.003	BU	0.0169	B	5.3
Fluoride	1.02		0.735		2.21		2.55		36
Lead	0.00315	J	0.00531	J	0.0025	U	0.0025	U	1
Molybdenum	0.333		0.115		0.0105		0.114		2
Nickel	0.0014	BJ	0.00222	BJ	0.00105	BJ	0.001	BU	2
Selenium	0.006	U	0.006	U	0.006	U	0.006	U	0.46
Silver	0.00101	J	0.00272	J	0.001	U	0.001	U	5
Zinc	0.1	B	0.0846	B	0.00843	BJ	0.0542	B	2.2

Permit Number:	2069-K		Regulatory
Station:	WW011		Limit
Date Collected:	9/20/2005		COA
Sample ID:	070008		(mg/L)
Analyte			
Aluminum	0.0447		900
Arsenic	0.0123		0.051
Barium	0.103		NE
Beryllium	0.0001	U	NE
Cadmium	0.000102	J	0.5
Calcium	43.4		NE
Chromium	0.00153	J	4.1
Cobalt	0.00074	J	NE
Copper	0.0173		5.3
Fluoride	0.517		36
Iron	0.679		NE
Lead	0.000549	J	1
Magnesium	7.95		NE
Manganese	0.035		NE
Mercury	0.00005	U	NE
Nickel	0.00383		2
Potassium	19.9		NE
Selenium	0.00376	J	0.46
Silver	0.000367	J	5
Sodium	45.7		NE
Thallium	0.000418	J	NE
Vanadium	0.01	U	NE
Zinc	0.0541		2.2

NOTES: COA = City of Albuquerque
J = Estimated value, the analyte concentration fell above the effective (MDL) minimum detection limit and below the effective (PQL) practical quantitation limit.
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.
B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).

This page intentionally left blank.

TABLE A-8. Summary of Sanitary Outfalls of Radiological Analyses, September 2005
(All Results in picocuries per liter [pCi/L] unless otherwise noted.)

Permit Number:	2069-A			2069F-4			2069I-3			2069-K			Regulatory
Station:	WW001			WW006			WW008			WW011			Sewer Release
Date Collected:	9/20/2005			9/20/2005			9/20/2005			9/20/2005			Limits*
Sample ID:	070004			070005			070007			070008			(Monthly Avg)
Analyte	Activity		MDA	Activity		MDA	Activity		MDA	Activity		MDA	
Actinium-228	6.18 ± 12.2	U	5.85	21.7 ± 9.46	X	8.66	12.4 ± 6.72	U	6.34	10.5 ± 6.21	U	5.71	300,000
Americium-241	-0.263 ± 9.01	U	6.83	-0.721 ± 2.89	U	2.39	3.54 ± 10.1	U	7.61	2.24 ± 8.01	U	6.83	200
Antimony-124	-1.27 ± 5.81	U	3.99	0.349 ± 5.52	U	4.69	1.1 ± 4.94	U	4.2	-4.5 ± 5.09	U	3.8	70,000
Antimony-125	-0.481 ± 4.21	U	3.55	-1.09 ± 5.13	U	4.21	2.07 ± 4.32	U	3.73	-3.03 ± 4.33	U	3.56	300,000
Barium-133	-0.0424	U	1.71	3.14 ± 3.07	U	1.99	-3.47 ± 2.2	U	1.75	-2.6 ± 2.15	U	1.74	200,000
Beryllium-7	3.12 ± 17.6	U	14.9	2.65 ± 21.4	U	17.7	0.497 ± 19.2	U	16.1	-2.15 ± 17.4	U	14.5	6,000,000
Bismuth-211	31.7 ± 21	X	7.79	23 ± 24.7	X	8.6	24.5 ± 10.7	X	9.8	26 ± 10.5	X	9.48	NE
Bismuth-212	18.6 ± 14.2	U	12.3	7.34 ± 36	U	14.5	16.3 ± 19.7	U	11.7	9.83 ± 13.2	U	11.2	70,000
Bismuth-214	12 ± 8.5	X	2.76	12.9 ± 9.66	X	3.35	0.0318 ± 7.67	U	3.46	9.52 ± 6.94	X	3.83	3,000,000
Cadmium-109	10.5 ± 41.5	U	31.3	24.3 ± 33.2	U	22.8	-19.3 ± 38.9	U	31.7	20.7 ± 40.5	U	30.8	60,000
Cerium-139	0.0851 ± 1.6	U	1.31	-0.158 ± 1.32	U	1.15	-0.223 ± 1.65	U	1.33	1.48 ± 1.78	U	1.27	700,000
Cerium-141	4.69 ± 3.91	U	3.31	0.895 ± 7.36	U	2.86	5.41 ± 4.34	U	3.66	1.12 ± 4.25	U	3.53	300,000
Cerium-144	1.73 ± 12	U	8.9	-6.43 ± 9.56	U	7.43	-3.43 ± 11.1	U	8.99	9.44 ± 10.6	U	8.89	30,000
Cesium-134	0.563 ± 1.86	U	1.54	0.155 ± 2.41	U	2.06	-0.301 ± 1.9	U	1.54	0.18 ± 2.46	U	1.4	9,000
Cesium-137	0.757 ± 1.8	U	1.51	0.906 ± 2.21	U	1.94	-0.811 ± 1.88	U	1.51	0.681 ± 1.67	U	1.41	10,000
Chromium-51	-19.2 ± 23.2	U	19.3	-17.7 ± 24.7	U	20.2	11.7 ± 25	U	21.7	9.22 ± 24	U	20.8	5,000,000
Cobalt-57	0.044 ± 1.3	U	1.08	0.773 ± 1.19	U	0.976	1.15 ± 1.42	U	1.19	0.93 ± 1.44	U	1.11	600,000
Cobalt-60	-0.51 ± 1.97	U	1.38	0.562 ± 2.39	U	2.1	1.38 ± 1.82	U	1.63	-1.14 ± 1.73	U	1.37	30,000
Europium-152	-2.79 ± 4.55	U	3.8	-0.386 ± 5.06	U	4.24	-1.63 ± 4.78	U	4.02	2.32 ± 4.51	U	3.92	100,000
Europium-154	1.76 ± 4.76	U	4.1	2.07 ± 6.71	U	5.62	0.729 ± 4.9	U	4.19	3.58 ± 4.45	U	3.97	70,000
Gross Alpha	1.96 ± 4.86	U	3.71	0.0392 ± 7.17	U	5.19	-2.99 ± 4.42	U	3.55	1 ± 4.34	U	3.74	NE
Gross Beta	5.58 ± 2.36		1.13	5.09 ± 2.2		1.18	3.42 ± 2.12		1.35	4.1 ± 1.89		1.03	NE
Iron-59	32.4 ± 3.91		2.22	33.4 ± 3.71		2.16	13.6 ± 3.06		2.18	28.7 ± 4.1		2.68	100,000
Lead-211	-53.2 ± 54	U	34.8	-2.99 ± 48.9	U	40.4	-0.262 ± 43.2	U	36.5	16.2 ± 43	U	36.1	2,000,000
Lead-212	9.88 ± 3.3	X	2.8	13.7 ± 3.25	X	2.89	7.72 ± 3.05	X	2.79	12.3 ± 3.35	X	2.85	20,000
Lead-214	11 ± 7.32	X	3.48	8.01 ± 8.59	X	3.75	9.98 ± 3.7	X	3.42	8.71 ± 3.69	X	3.31	1,000,000
Manganese-54	-0.19 ± 1.73	U	1.4	-0.263 ± 2.37	U	1.99	0.707 ± 1.84	U	1.54	-1.22 ± 1.68	U	1.3	300,000
Mercury-203	2.95 ± 3.07	U	1.75	0.421 ± 2.24	U	1.92	-0.801 ± 2.37	U	2.01	-0.0473 ± 2.25	U	1.94	300,000
Neptunium-237	6.11 ± 21.7	U	9.23	7.04 ± 9.73	U	5.98	-3.27 ± 11.6	U	9.52	7.46 ± 20.2	U	9.08	300,000
Neptunium-239	-1.95 ± 9.62	U	7.94	0.52 ± 8.65	U	6.99	3.46 ± 10.5	U	8.66	-1.32 ± 9.87	U	8.17	300,000
Niobium-95	2.31 ± 2.65	U	2.27	2.96 ± 3.5	U	3.1	-0.913 ± 2.73	U	2.19	0.922 ± 2.87	U	2.39	300,000
Potassium-40	47.1 ± 46.7	X	15.2	66.3 ± 26.7	X	26	89.4 ± 23.7	X	24.4	35.2 ± 38.9	X	14.8	40,000
Protactinium-231	-17.9 ± 71	U	60.7	-30.3 ± 75.9	U	63.5	-3.76 ± 74.1	U	63.4	29.6 ± 78.9	U	60.9	60
Protactinium-233	2.06 ± 3.94	U	2.66	-0.311 ± 3.23	U	2.72	-1.38 ± 3.14	U	2.64	-1.41 ± 3.04	U	2.57	200,000
Protactinium-234	8.45 ± 12.1	U	10.7	19 ± 21.7	U	16.9	-5.07 ± 12.9	U	10.8	-6.38 ± 13.2	U	10.9	300,000
Radium-223	-34.6 ± 32.6	U	26.5	-5.55 ± 34.2	U	28.7	-2.1 ± 31.2	U	26.5	-20.4 ± 30.8	U	25.7	1,000
Radium-224	-66.2 ± 36.7	U	27.8	-97 ± 34.4	U	26.4	-7.06 ± 33.7	U	28.9	-81 ± 36.8	U	27.3	2,000
Radium-226	12 ± 8.5	X	2.76	12.9 ± 9.66	X	3.35	0.0318 ± 7.67	U	3.46	9.52 ± 6.94	X	3.83	600
Radium-228	6.18 ± 12.2	U	5.85	21.7 ± 9.46	X	8.66	12.4 ± 6.72	U	6.34	10.5 ± 6.21	U	5.71	600

See notes at end of table.

TABLE A-8. Summary of Sanitary Outfalls of Radiological Analyses, September 2005 (concluded)
(All Results in picocuries per liter [pCi/L] unless otherwise noted.)

Permit Number:	**2069-A**			**2069F-4**			**2069I-3**			**2069-K**			**Regulatory**
Station:	**WW001**			**WW006**			**WW008**			**WW011**			**Sewer Release**
Date Collected:	**9/20/2005**			**9/20/2005**			**9/20/2005**			**9/20/2005**			**Limits***
Sample ID:	**070004**			**070005**			**070007**			**070008**			**(Monthly Avg)**
Analyte	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	
Radon-219	19.8 ± 19.4	U	16.9	-5.45 ± 21.9	U	18	-0.925 ± 19.5	U	16.5	13.4 ± 19.2	U	16.7	NE
Rhodium-106	6.52 ± 15.4	U	13.1	-0.0393	U	17.7	-7.47 ± 16	U	12.9	2.4 ± 15.3	U	12.8	1,000,000
Ruthenium-103	0.564 ± 2.37	U	2.01	6.78 ± 5.15	X	2.36	1.04 ± 3.74	U	2.05	-2.57 ± 2.48	U	1.96	300,000
Ruthenium-106	4.26 ± 15.3	U	12.9	-2.03 ± 20.1	U	17.3	-5.05 ± 16	U	13	2.78 ± 15.3	U	12.8	30,000
Selenium-75	0.849 ± 2.23	U	1.95	2.66 ± 2.22	U	1.97	0.667 ± 2.32	U	2.01	-0.389 ± 2.19	U	1.88	70,000
Sodium-22	0.646 ± 1.71	U	1.48	0.724 ± 2.41	U	2.02	0.256 ± 1.77	U	1.51	1.28 ± 1.6	U	1.43	20,000
Strontium-85	-20.2 ± 3.46	U	2.14	4 ± 2.79	U	2.19	-18.7 ± 3.5	U	2.38	-21.9 ± 3.71	U	2.31	400,000
Thallium-208	3.41 ± 1.91	U	1.69	3.39 ± 5.76	U	1.8	2.96 ± 1.9	U	1.7	5 ± 1.91	X	1.73	NE
Thorium-227	0.437 ± 18.3	U	15.9	-16.2 ± 18.4	U	15.1	7.45 ± 19	U	16.6	23.6 ± 23.2	U	15.6	20,000
Thorium-231	8.07 ± 8.29	U	7.34	6.27 ± 9.79	U	7.53	-3.83 ± 8.66	U	7.33	5.52 ± 8.29	U	7.29	500,000
Thorium-232	9.65 ± 3.22	X	2.74	13.3 ± 3.17	X	2.82	7.45 ± 2.97	X	2.71	12 ± 3.26	X	2.77	300
Thorium-234	98.3 ± 124	U	55	33.1 ± 73	U	38.9	120 ± 85.4	U	66.8	25 ± 121	U	54.9	50,000
Tin-113	0.454 ± 2.24	U	1.92	-0.27 ± 2.58	U	2.14	-0.0334	U	1.89	-1.56 ± 2.23	U	1.84	300,000
Tritium	-110 ± 181	U	156	-119 ± 129	U	113	-206 ± 130	U	118	-122 ± 132	U	116	10,000,000
Uranium-235	18.7 ± 11.2	U	9.3	3.98 ± 19.4	U	8.45	5.34 ± 11.2	U	9.25	12.9 ± 11.1	U	9.24	3,000
Uranium-238	98.3 ± 124	U	55	33.1 ± 73	U	22.4	120 ± 85.4	U	66.8	25 ± 121	U	54.9	3,000
Yttrium-88	-0.583 ± 2.01	U	1.68	-0.688 ± 2.03	U	1.61	-0.477 ± 2.05	U	1.64	1.43 ± 1.99	U	1.81	100,000
Zinc-65	-0.108 ± 3.81	U	3.22	0.983 ± 5.98	U	4.39	-4.09 ± 3.8	U	2.96	-2.59 ± 3.78	U	3.05	50,000
Zirconium-95	-0.599 ± 3.41	U	2.76	-0.952 ± 4.7	U	3.96	-1.89 ± 4.01	U	3.19	1.64 ± 3.82	U	2.86	200,000

NOTES: U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.
X = Presumptive evidence analyte is not present.
NE = not established.
MDA = minimum detectable activity.
* = The monthley average concentration values foe release of sanitary sewage were derived by taking the most restictive occupational stochastic oral ingestion annual limits on intake(ALT) for a reference man.

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, September 2005
(All Results in micrograms per liter [ug/L] unless otherwise noted.)

Permit Number:	2069-A		2069F-4		2069I-3		2069-K	
Station:	**WW001**		**WW006**		**WW008**		**WW011**	
Date Collected:	**9/20/2005**		**9/20/2005**		**9/20/2005**		**9/20/2005**	
Sample ID:	**070004**		**070005**		**070007**		**070008**	
Analyte								
1,1,1-Trichloroethane	0.3	U	0.3	U	0.3	U	0.3	U
1,1,2,2-Tetrachloroethane	0.25	U	0.25	U	0.25	U	0.25	U
1,1,2-Trichloroethane	0.25	U	0.25	U	0.25	U	0.25	U
1,1-Dichloroethane	0.3	U	0.3	U	0.3	U	0.3	U
1,1-Dichloroethylene	0.3	U	0.3	U	0.3	U	0.3	U
1,2-Dichloroethane	0.25	U	0.25	U	0.25	U	0.25	U
1,2-Dichloropropane	0.25	U	0.25	U	0.25	U	0.25	U
2-Butanone	1.25	U	2.79	J	1.54	J	4.33	J
2-Hexanone	1.25	U	1.25	U	1.25	U	1.25	U
4-Methyl-2-pentanone	1.25	U	1.25	U	1.25	U	1.25	U
Acetone	34.7		61.1		64.1		50.7	
Benzene	0.3	U	0.3	U	0.3	U	0.3	U
Bromodichloromethane	0.25	U	0.25	U	0.25	U	0.25	U
Bromoform	0.25	U	0.25	U	0.25	U	0.25	U
Bromomethane	0.5	U	0.5	U	0.5	U	0.5	U
Carbon disulfide	1.25	U	1.25	U	1.25	U	1.25	U
Carbon tetrachloride	0.25	U	0.25	U	0.25	U	0.25	U
Chlorobenzene	0.25	U	0.25	U	0.25	U	0.25	U
Chloroethane	0.5	U	0.5	U	0.5	U	0.5	U
Chloroform	0.25	U	0.25	U	0.25	U	0.803	J
Chloromethane	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethylene	0.3	U	0.3	U	0.3	U	0.3	U
cis-1,3-Dichloropropylene	0.25	U	0.25	U	0.25	U	0.25	U
Dibromochloromethane	0.25	U	0.25	U	0.25	U	0.25	U
Ethylbenzene	0.25	U	0.25	U	0.25	U	0.25	U
Methylene chloride	2	U	2	U	2	U	2	U
Styrene	0.25	U	0.25	U	0.25	U	0.25	U
Tetrachloroethylene	0.25	U	0.25	U	0.25	U	0.25	U
Toluene	0.25	U	0.25	U	0.25	U	0.991	J
trans-1,2-Dichloroethylene	0.3	U	0.3	U	0.3	U	0.3	U
trans-1,3- Dichloropropylene	0.25	U	0.25	U	0.25	U	0.25	U
Trichloroethylene	0.25	U	0.25	U	0.25	U	0.25	U
Vinyl acetate	1.5	U	1.5	U	1.5	U	1.5	U
Vinyl chloride	0.5	U	0.5	U	0.5	U	0.5	U
Xylenes (total)	0.25	U	0.25	U	0.25	U	0.25	U

NOTES: U=The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

J=Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL. SNL/NM uses the City of Albuquerque's value of 3.2 mg/L as the standard (that value has not been exceeded). This value is derived from the summation of all values greater than 0.01 mg/L for the list of toxic organics as developed by the EPA for each National Categorical Pretreatment Standard. For non-categorical users, the summation of all values above 0.01 mg/L of those listed in 40 CFR 122, Appendix D, Table II, or as directed by the Industrial Waste Engineer. Based on the Sewer Use and Wastewater Control Table, this value should never exceed 3.2 mg/L.

This page intentionally left blank.

TABLE A-10. Permitted Sanitary Outfalls, September 2005
(All results in milligrams per liter [mg/L] unless otherwise noted.)

Permit Number:	**2069-A**		**2069F-4**		**2069G-2**		**2069I-3**		**2069-K**		**Regulatory**
Station:	**WW001**		**WW006**		**WW007**		**WW008**		**WW011**		**Limit**
Date Collected:	**9/21/2005**		**9/21/2005**		**9/21/2005**		**9/21/2005**		**9/21/2005**		**COA**
Sample ID:	**070010**		**070011**		**070012**		**070013**		**070014**		**(mg/L)**
Analyte											
Aluminum	0.161	J	0.9		0.187	J	0.315		0.16	J	900
Arsenic	0.0207		0.006	U	0.0169		0.0164		0.016		0.051
Boron	0.172		0.01	U	0.199		0.127		0.199		NE
Cadmium	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.5
Chromium	0.00382	J	0.00212	J	0.00438	J	0.00271	J	0.00678		4.1
Copper	0.0344		0.00685	J	0.00998	J	0.0152		0.0348		5.3
Fluoride	0.991		0.771		2.26		3.13		0.631		36
Lead	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.00288	J	1
Molybdenum	0.298		0.0407		0.12		0.16		0.182		2
Nickel	0.00343	J	0.00231	J	0.00151	J	0.00206	J	0.00396	J	2
Selenium	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.46
Silver	0.001	U	0.001	U	0.00644		0.001	U	0.001	U	5
Zinc	0.0801	B	0.002	BU	0.0347	B	0.0666	B	0.136	B	2.2

NOTES: COA = City of Albuquerque
J = Estimated value, the analyte concentration fell above the effective (MDL) minimum detection limit and below the effective (PQL) practical quantitation limit.
U =The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.
B =The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).

This page intentionally left blank.

TABLE A-11. Summary of Sanitary Outfalls of Semi-Volatile Organic Compounds, September 2005
(All Results in micrograms per liter [ug/L] unless otherwise noted.)

Permit Number:	**2069-A**		**2069F-4**		**2069I-3**		**2069-K**	
Station:	**WW001**		**WW006**		**WW008**		**WW011**	
Date Collected:	**9/21/2005**		**9/21/2005**		**9/21/2005**		**9/21/2005**	
Sample ID:	**070010**		**070011**		**070013**		**070014**	
Analyte								
1,2,4-Trichlorobenzene	1.82	U	1.98	U	2	Uh	1.9	U
2,4,6-Trichlorophenol	1.82	U	1.98	U	2	Uh	1.9	U
2,4-Dichlorophenol	1.82	U	1.98	U	2	Uh	1.9	U
2,4-Dimethylphenol	1.82	U	1.98	U	2	Uh	1.9	U
2,4-Dinitrophenol	9.09	U	9.9	U	10	Uh	9.52	U
2,4-Dinitrotoluene	1.82	U	1.98	U	2	Uh	1.9	U
2,6-Dinitrotoluene	1.82	U	1.98	U	2	Uh	1.9	U
2-Chloronaphthalene	0.318	U	0.347	U	0.35	Uh	0.333	U
2-Chlorophenol	1.82	U	1.98	U	2	Uh	1.9	U
2-Methyl-4,6-dinitrophenol	2.73	U	2.97	U	3	Uh	2.86	U
2-Nitrophenol	1.82	U	1.98	U	2	Uh	1.9	U
4-Chloro-3-methylphenol	1.82	U	1.98	U	2	Uh	1.9	U
4-Nitrophenol	1.82	U	1.98	U	2	Uh	1.9	U
Acenaphthene	0.282	U	0.307	U	0.31	Uh	0.295	U
Acenaphthylene	0.182	U	0.198	U	0.2	Uh	0.19	U
Anthracene	0.182	U	0.198	U	0.2	Uh	0.19	U
Benzo(a)anthracene	0.182	U	0.198	U	0.2	Uh	0.19	U
Benzo(a)pyrene	0.182	U	0.198	U	0.2	Uh	0.19	U
Benzo(b)fluoranthene	0.182	U	0.198	U	0.2	Uh	0.19	U
Benzo(ghi)perylene	0.182	U	0.198	U	0.2	Uh	0.19	U
Benzo(k)fluoranthene	0.182	U	0.198	U	0.2	Uh	0.19	U
bis(2- Chloroethoxy)methane	2.73	U	2.97	U	3	Uh	2.86	U
bis(2-Chloroethyl) ether	1.82	U	1.98	U	2	Uh	1.9	U
bis(2-Chloroisopropyl)ether	1.82	U	1.98	U	2	Uh	1.9	U
bis(2-Ethylhexyl)phthalate	2.29	J	3.1	J	3.22	Jh	1.9	U
Chrysene	0.182	U	0.198	U	0.2	Uh	0.19	U
Dibenzo(a,h)anthracene	0.182	U	0.198	U	0.2	Uh	0.19	U
Dibenzofuran	1.82	U	1.98	U	2	Uh	1.9	U
Diethylphthalate	1.82	U	1.98	U	2	Uh	1.9	U
Di-n-butylphthalate	1.82	U	1.98	U	2	Uh	1.9	U
Di-n-octylphthalate	2.73	U	2.97	U	3	Uh	2.86	U
Fluoranthene	0.182	U	0.198	U	0.2	Uh	0.19	U
Fluorene	0.182	U	0.198	U	0.2	Uh	0.19	U
Hexachlorobenzene	1.82	U	1.98	U	2	Uh	1.9	U
Hexachlorobutadiene	1.82	U	1.98	U	2	Uh	1.9	U
Hexachlorocyclopentadiene	1.82	U	1.98	U	2	Uh	1.9	U
Hexachloroethane	1.82	U	1.98	U	2	Uh	1.9	U

See notes at end of table.

TABLE A-11. Summary of Sanitary Outfalls of Semi-Volatile Organic Compounds, September 2005 (concluded) *(All Results in micrograms per liter [ug/L] unless otherwise noted.)*

Permit Number:	**2069-A**		**2069F-4**		**2069I-3**		**2069-K**	
Station:	**WW001**		**WW006**		**WW008**		**WW011**	
Date Collected:	**9/21/2005**		**9/21/2005**		**9/21/2005**		**9/21/2005**	
Sample ID:	**070010**		**070011**		**070013**		**070014**	
Analyte								
Indeno(1,2,3-cd)pyrene	0.182	U	0.198	U	0.2	Uh	0.19	U
Isophorone	1.82	U	1.98	U	2	Uh	1.9	U
Naphthalene	0.273	U	0.297	U	0.3	Uh	0.286	U
Nitrobenzene	2.73	U	2.97	U	3	Uh	2.86	U
N-Nitrosodipropylamine	1.82	U	1.98	U	2	Uh	1.9	U
Pentachlorophenol	1.82	U	1.98	U	2	Uh	1.9	U
Phenanthrene	0.182	U	0.198	U	0.2	Uh	0.19	U
Phenol	0.909	U	0.99	U	1	Uh	0.952	U
Pyrene	0.273	U	0.297	U	0.3	Uh	0.286	U

NOTES: U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
h = Prep holding time exceeded.

TABLE A-12. Permitted Sanitary Outfalls, September 2005
(All results in milligrams per liter [mg/L] unless otherwise noted.)

Permit Number:	**2069-K**		**Regulatory**
Station:	**WW011**		**Limit**
Date Collected:	**9/23/2005**		**COA**
Sample ID:	**071797***		**(mg/L)**
Analyte			
Aluminum	0.0859		900
Antimony	0.0005	U	NE
Arsenic	0.0152		0.051
Barium	0.64		NE
Beryllium	0.0001	U	NE
Cadmium	0.0001	U	0.5
Calcium	263		NE
Chromium	0.00226	J	4.1
Cobalt	0.00151		NE
Copper	0.0265		5.3
Iron	2.45		NE
Lead	0.00192	J	1
Magnesium	30.7		NE
Manganese	0.0574		NE
Mercury	0.00005	U	NE
Nickel	0.0116		2
Potassium	30		NE
Selenium	0.0025	U	0.46
Silver	0.00889		5
Sodium	517		NE
Thallium	0.0004	U	NE
Vanadium	0.01	U	NE
Zinc	0.0925		2.2

NOTES: COA = City of Albuquerque
J = Estimated value, the analyte concentration fell above the effective (MDL) minimum detection limit and below the effective (PQL) practical quantitation limit.
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.
* = decontamination sample

This page intentionally left blank.

TABLE A-13. Summary of Sanitary Outfalls of Radiological Analyses, September 2005
(All Results in picocuries per liter [pCi/L] unless otherwise noted.)

Permit Number:	**2069-K**		**Regulatory**
Station:	**WW011**		**Limit**
Date Collected:	**9/23/2005**		**COA**
Sample ID:	**071797***		**(mg/L)**
Analyte			
Actinium-228	13.6 ± 6.83	X	300,000
Americium-241	1.61 ± 9.65	U	200
Antimony-124	-1.74 ± 4.7	U	70,000
Antimony-125	4.61 ± 4.25	U	300,000
Barium-133	-3.32 ± 2.19	U	200,000
Beryllium-7	7.24 ± 17.7	U	6,000,000
Bismuth-211	27.5 ± 10.5	X	NE
Bismuth-212	4.58 ± 13.1	U	70,000
Bismuth-214	12.7 ± 3.95	X	3,000,000
Cadmium-109	-4.19 ± 39.6	U	60,000
Cerium-139	0.91 ± 1.75	U	700,000
Cerium-141	4.43 ± 4.27	U	300,000
Cerium-144	-3.64 ± 11.3	U	30,000
Cesium-134	-0.784 ± 1.93	U	9,000
Cesium-137	0.601 ± 1.87	U	10,000
Chromium-51	-13.5 ± 22.1	U	5,000,000
Cobalt-57	0.462 ± 1.43	U	600,000
Cobalt-60	1.88 ± 1.79	U	30,000
Europium-152	1.2 ± 4.72	U	100,000
Europium-154	-0.387 ± 5.39	U	70,000
Iron-59	0.515 ± 4.46	U	100,000
Lead-211	-18.1 ± 46	U	2,000,000
Lead-212	2.47 ± 5.69	U	20,000
Lead-214	10.3 ± 3.69	X	1,000,000
Manganese-54	0.735 ± 1.69	U	300,000
Mercury-203	1.43 ± 2.21	U	300,000
Neptunium-237	10.8 ± 11.6	U	300,000
Neptunium-239	-6.08 ± 10.6	U	300,000
Niobium-95	1.37 ± 2.57	U	300,000
Potassium-40	9.06 ± 48.1	U	40,000
Protactinium-231	-21.4 ± 75.1	U	60
Protactinium-233	1.13 ± 3.22	U	200,000
Protactinium-234	2.7 ± 13.9	U	300,000
Radium-223	-10.4 ± 31.8	U	1,000
Radium-224	55.7 ± 45.1	X	2,000
Radium-226	12.7 ± 3.95	X	600
Radium-228	13.6 ± 6.83	X	600
Radon-219	-1.97 ± 20.8	U	NE
Rhodium-106	-3.89 ± 15.8	U	1,000,000
Ruthenium-103	-1.31 ± 2.33	U	300,000
Ruthenium-106	-5.09 ± 16.1	U	30,000
Selenium-75	-0.815 ± 2.19	U	70,000
Sodium-22	-0.112 ± 1.94	U	20,000
Strontium-85	-17.7 ± 3.35	U	400,000
Thallium-208	1.04 ± 3.69	U	NE
Thorium-227	-13.3 ± 18.9	U	20,000
Thorium-231	3.95 ± 8.88	U	500,000
Thorium-232	2.42 ± 5.56	U	300
Thorium-234	134 ± 75.7	U	50,000

See notes at end of table.

TABLE A-13. Summary of Sanitary Outfalls of Radiological Analyses, September 2005 (concluded)
(All Results in picocuries per liter [pCi/L] unless otherwise noted.)

Permit Number:	**2069-K**		**Regulatory**
Station:	**WW011**		**Limit**
Date Collected:	**9/23/2005**		**COA**
Sample ID:	**071797***		**(mg/L)**
Analyte			
Tin-113	-2 ± 2.3	U	NE
Uranium-235	0.000029	J	3,000
Uranium-235	17.9 ± 12.8	U	3,000
Uranium-238	0.00444		3,000
Uranium-238	134 ± 75.7	U	3,000
Yttrium-88	9.83 ± 4.04	X	100,000
Zinc-65	-1.3 ± 3.64	U	NE
Zirconium-95	-1.39 ± 3.42	U	200,000

NOTES: X = Presumptive evidence analyte is not present.
NE = not established.
MDA = minimum detectable activity.
* = decontamination sample
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

APPENDIX B
2005 GROUNDWATER CONTAMINANT CONCENTRATION TRENDS

This page intentionally left blank.

CONTENTS

FIGURES

This page intentionally left blank.

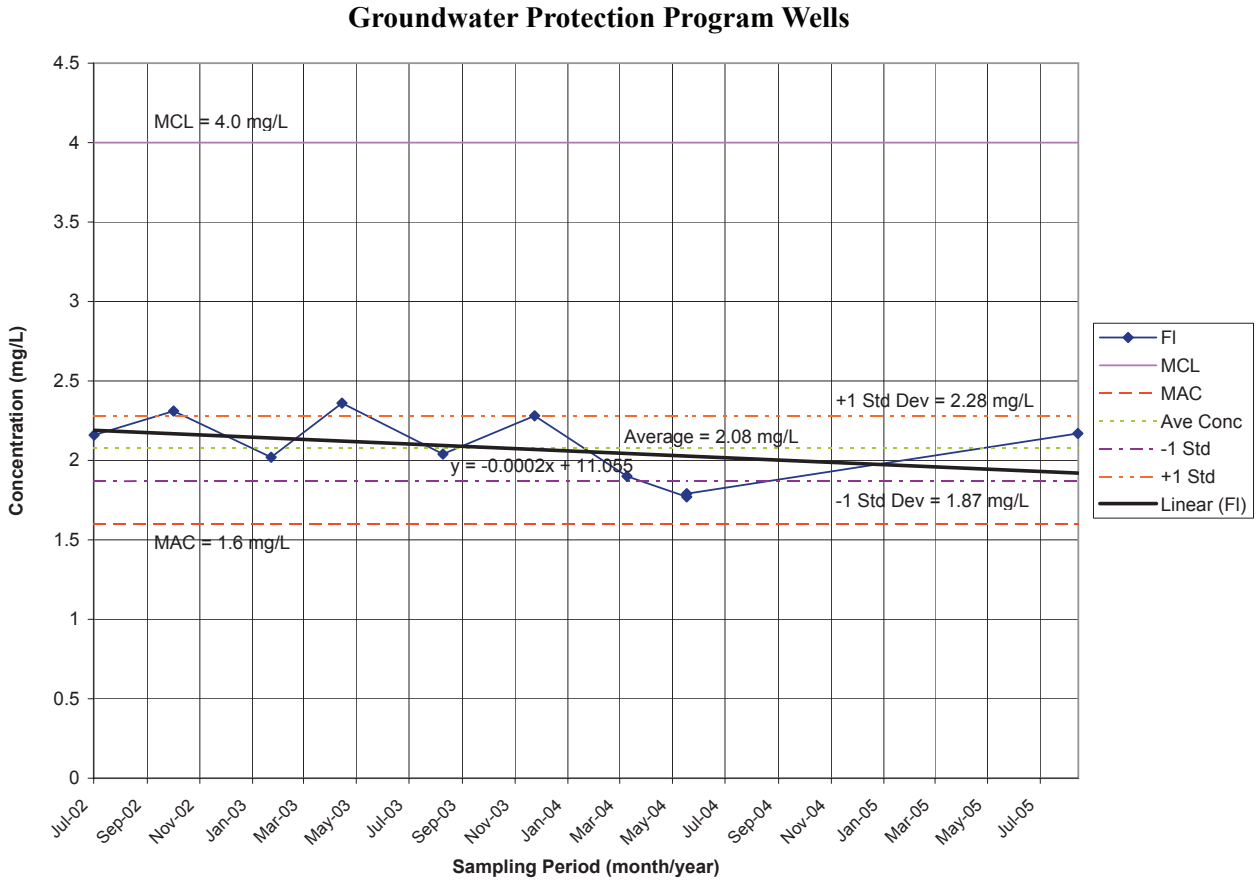


FIGURE B-1. Fluoride Concentrations, CTF-MW2

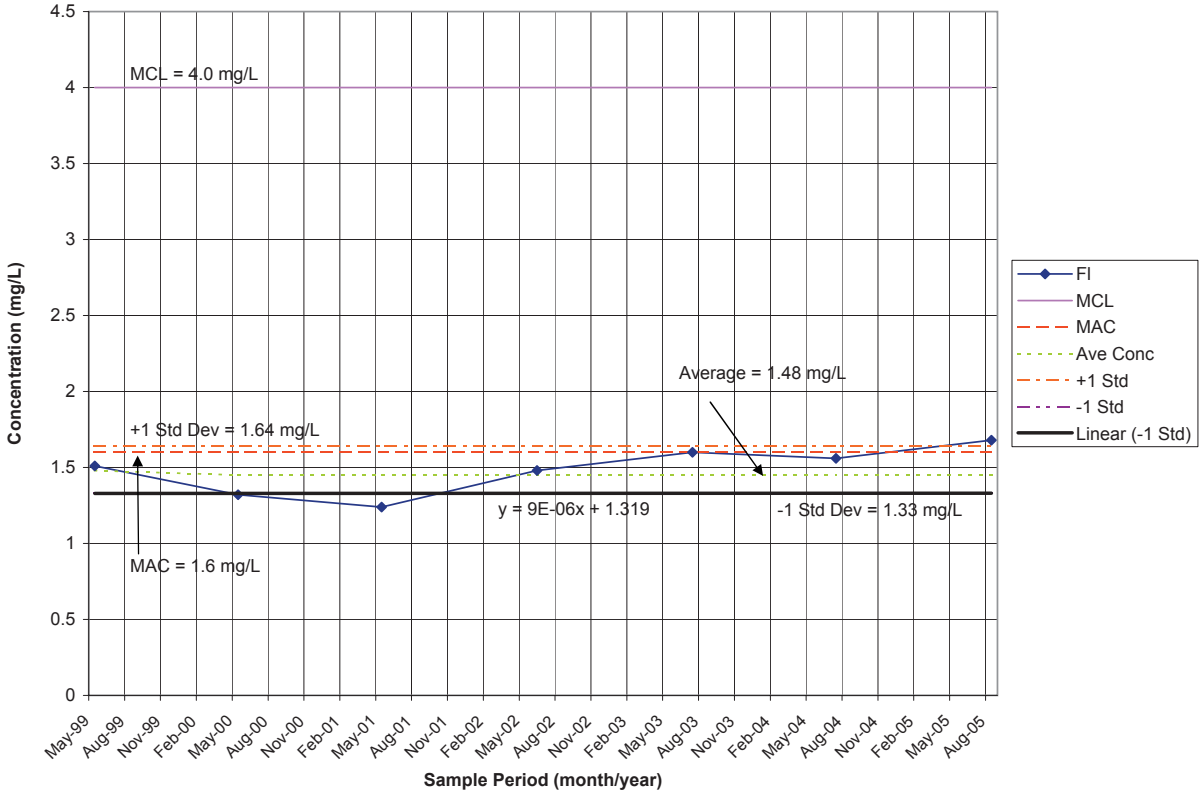


FIGURE B-2. Fluoride Concentrations, SFR-2S

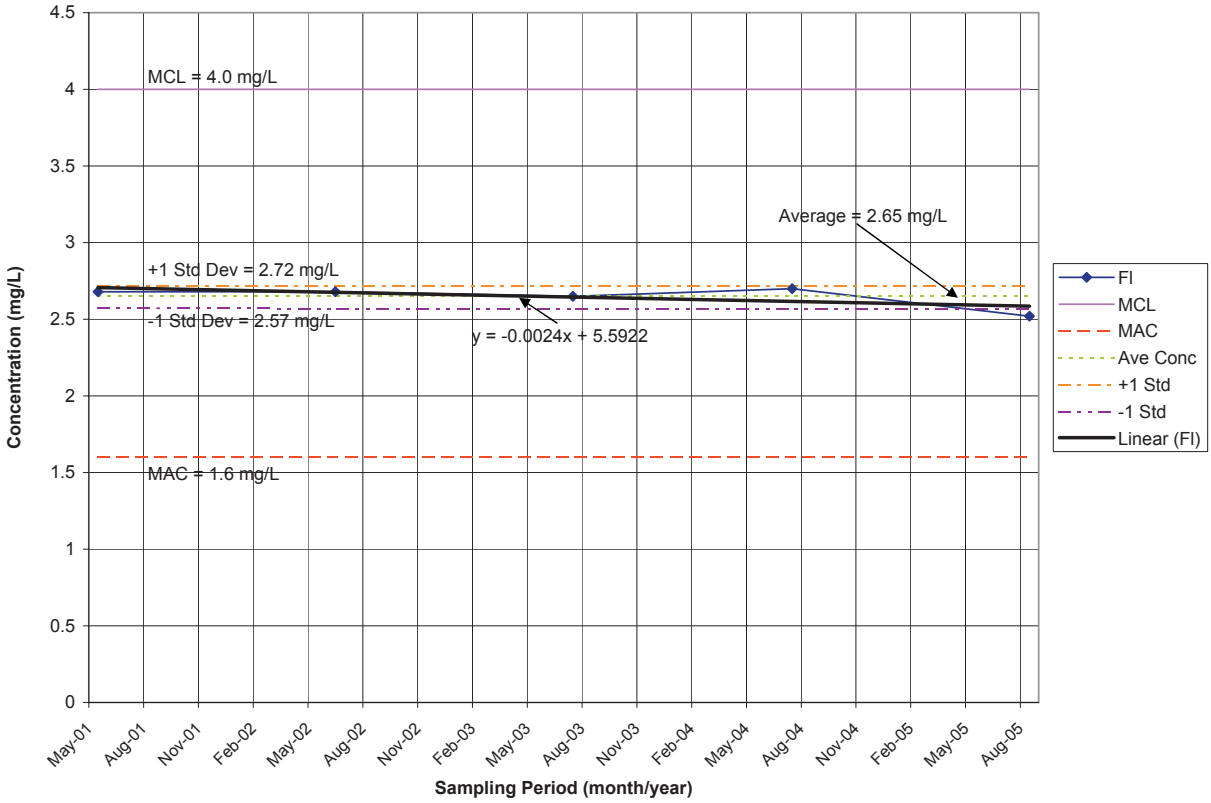


FIGURE B-3. Fluoride Concentrations, SFR-4T

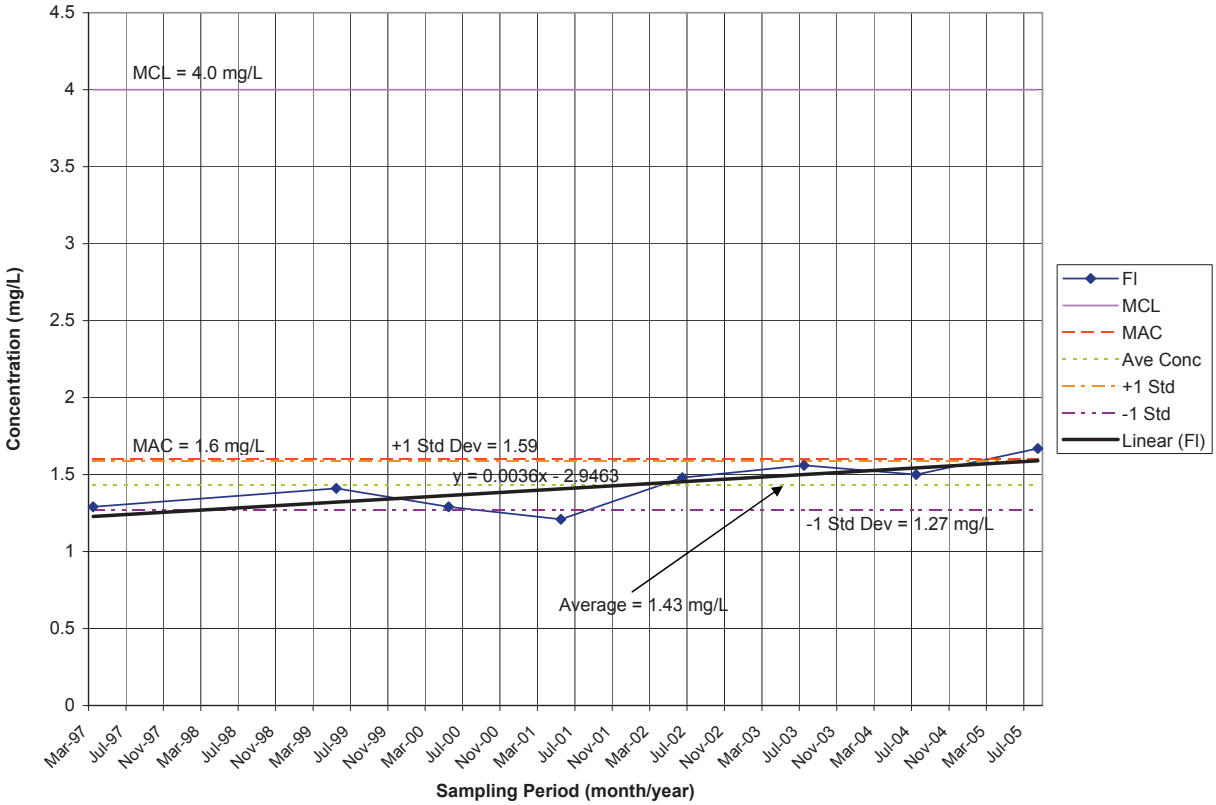


FIGURE B-4. Fluoride Concentrations, TRE-1

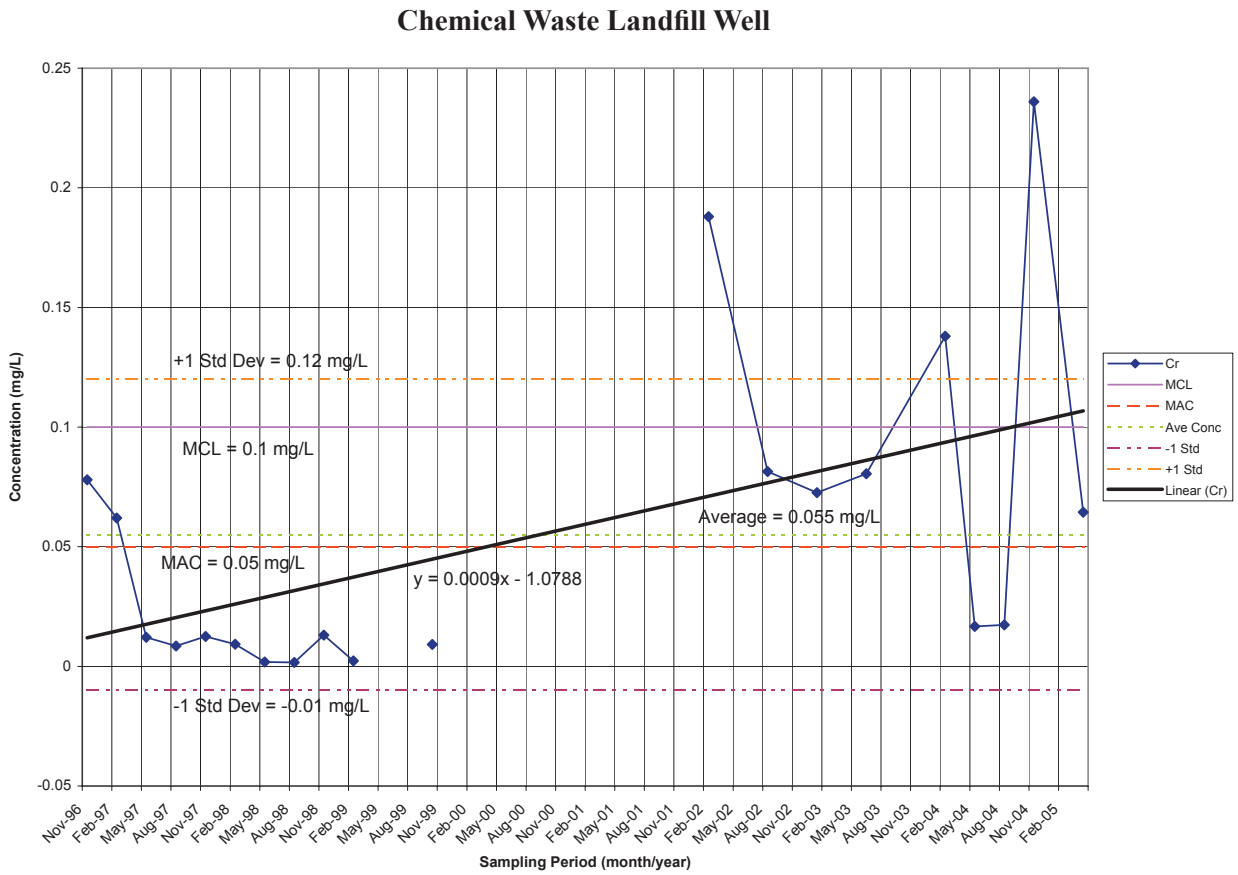


FIGURE B-5. Chromium Concentrations, CWL-BW3

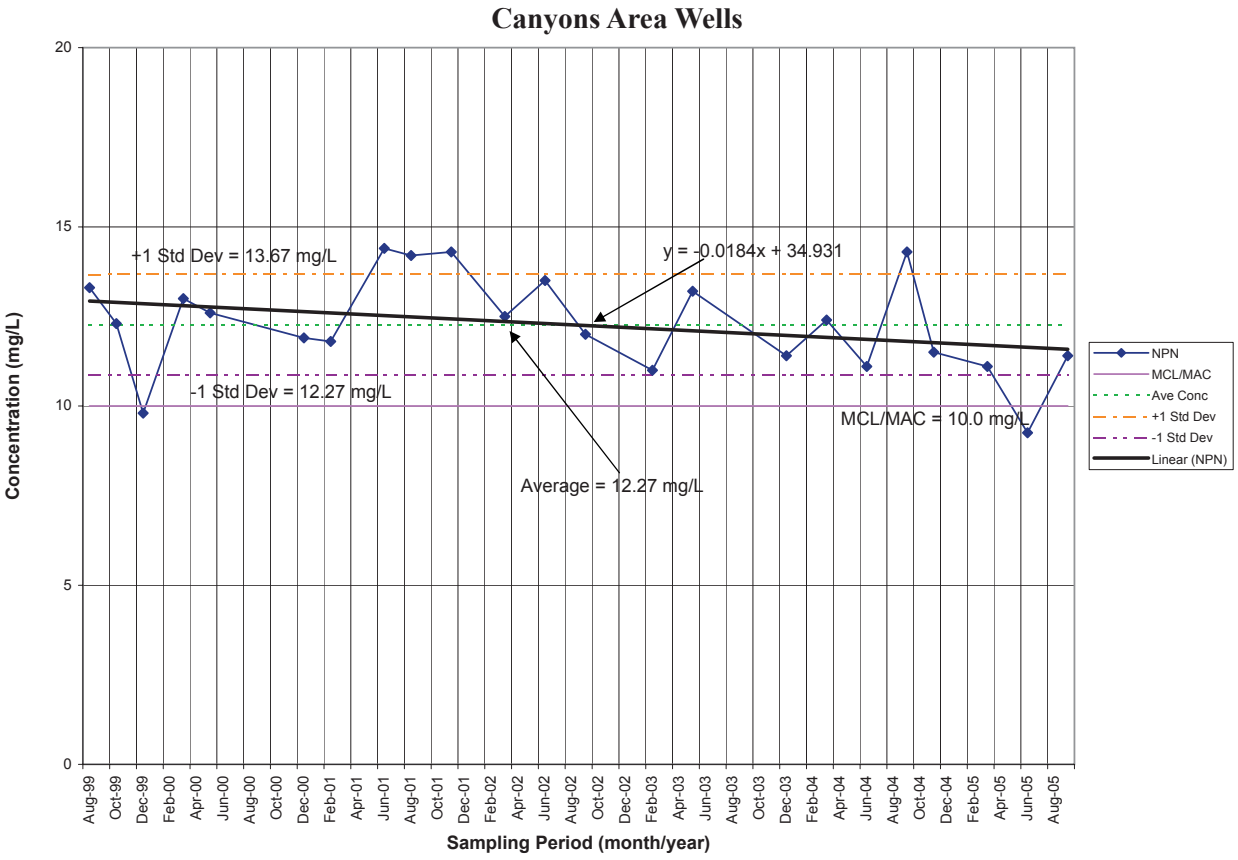


FIGURE B-6. Off-Site Nitrate plus Nitrite Concentrations, CYN-MW3

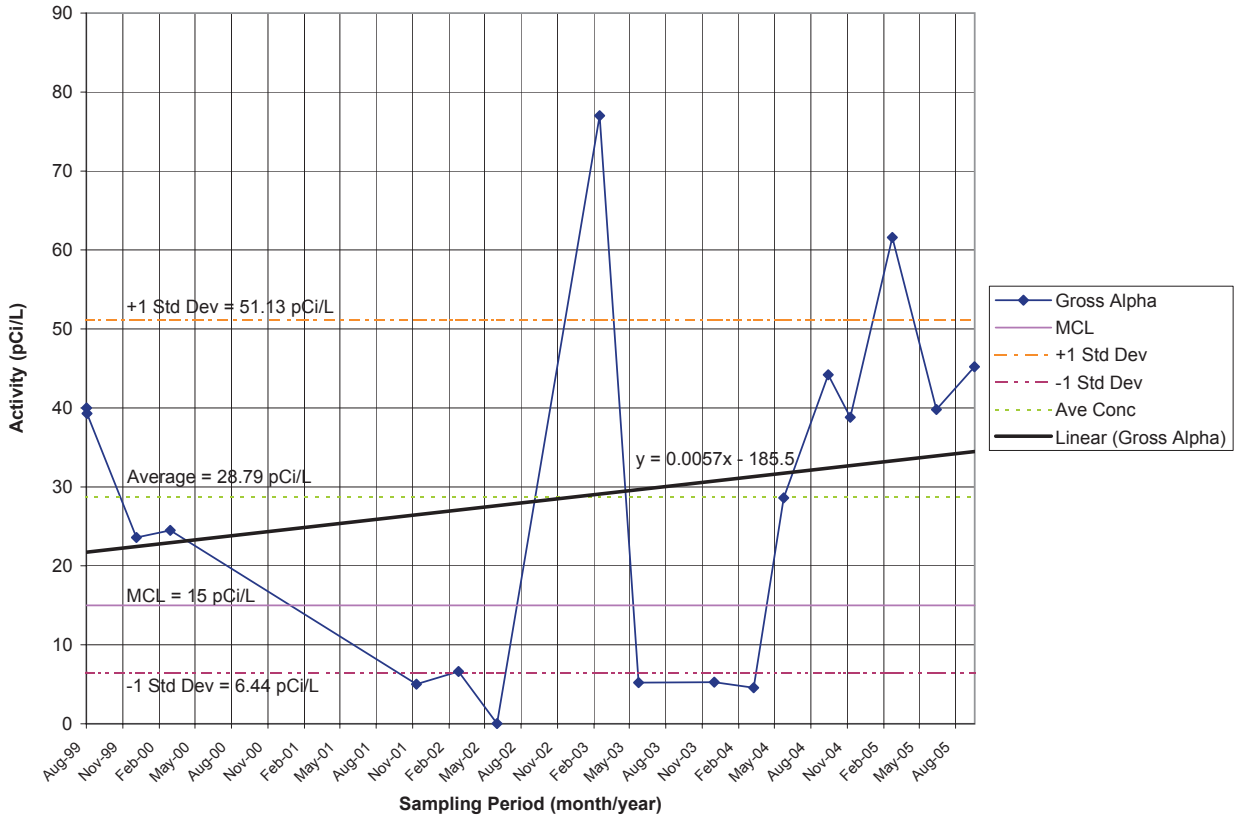


FIGURE B-7. Gross Alpha Activity, CYN-MW4

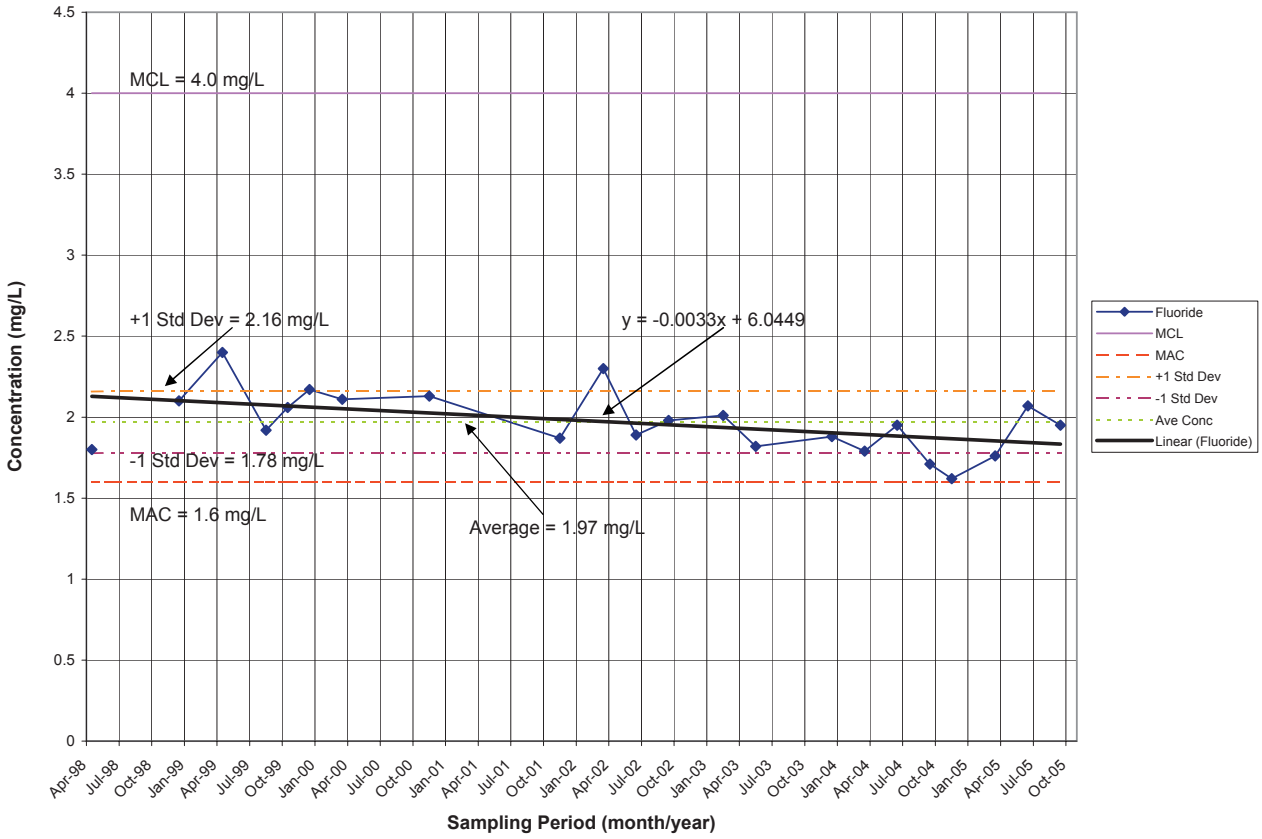


FIGURE B-8. Fluoride Concentrations, CYN-MW1D

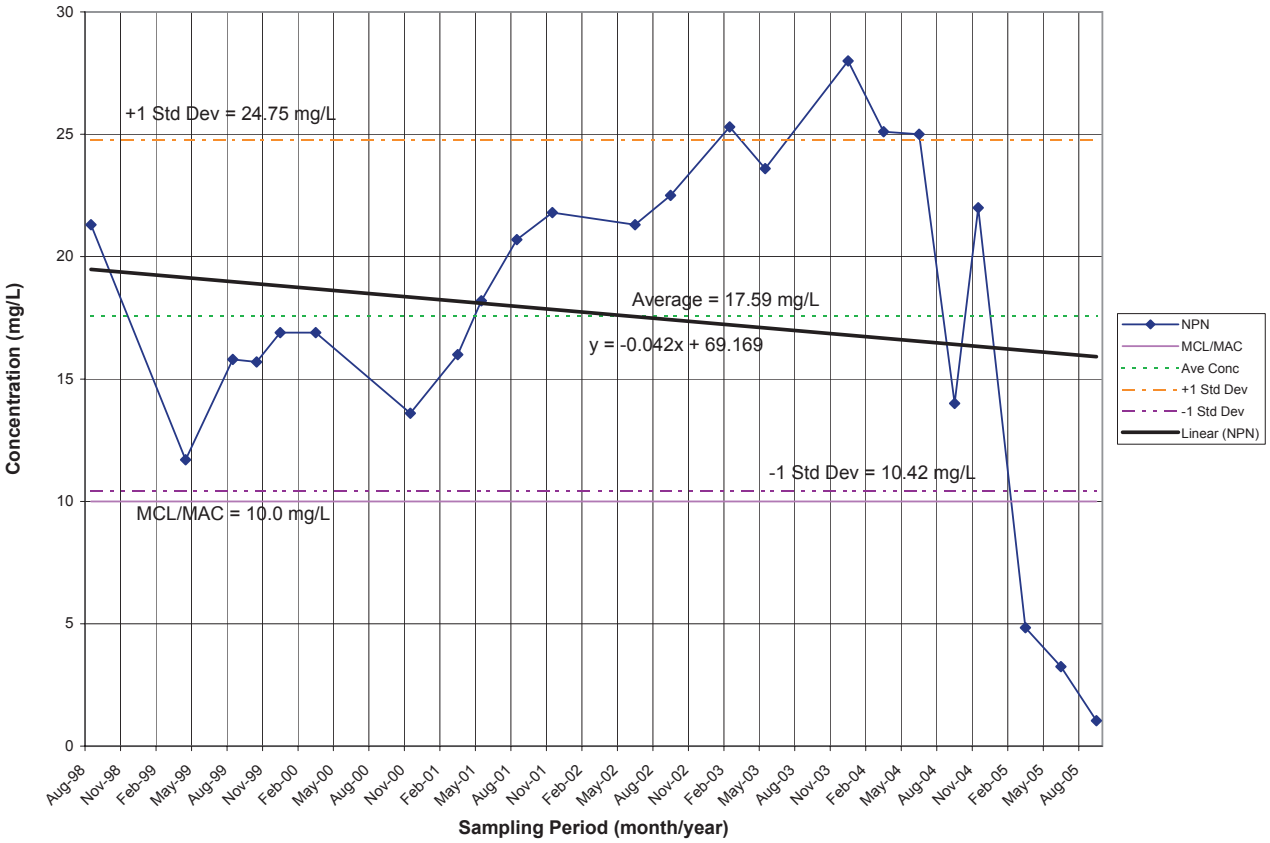


FIGURE B-9. Off-Site Nitrate plus Nitrite Concentrations, CYN-MW1D

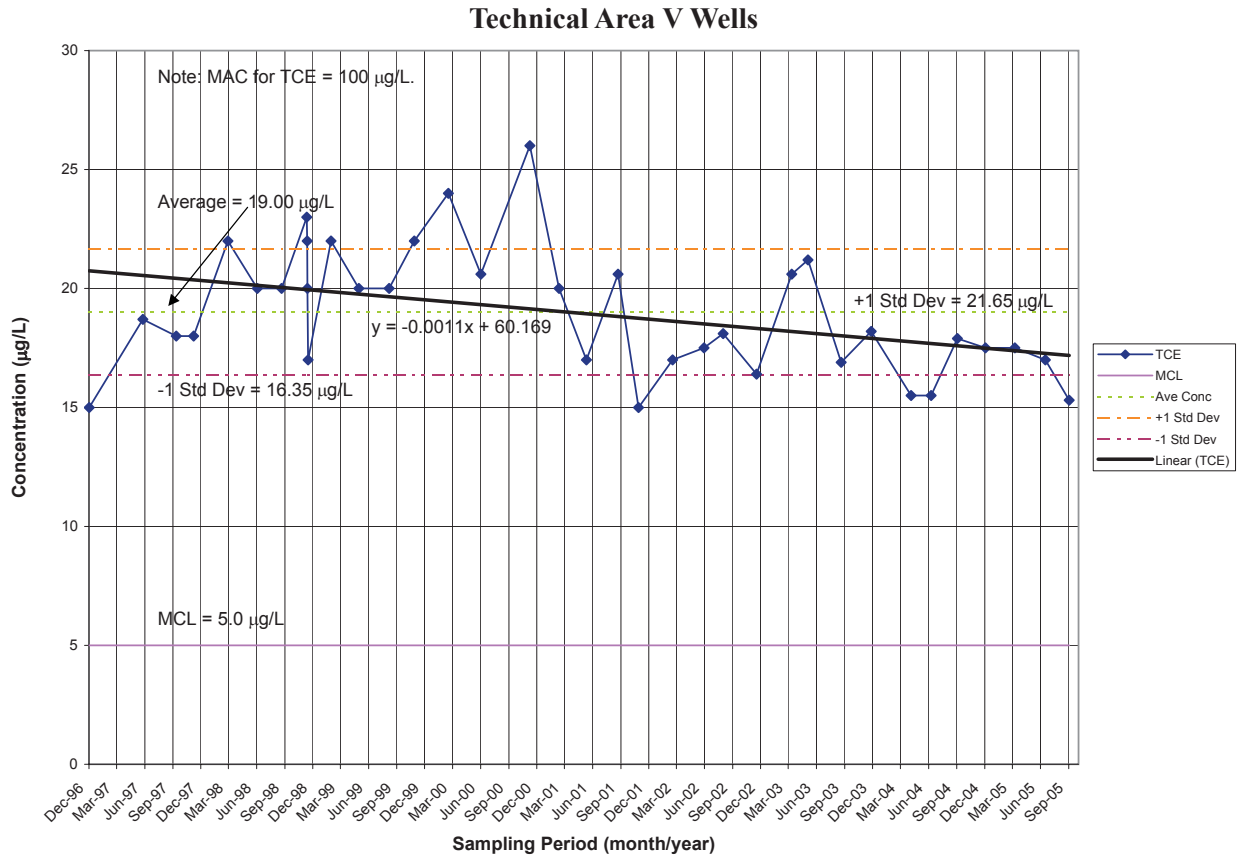


FIGURE B-10. Trichloroethene Concentrations, LWDS-MW1

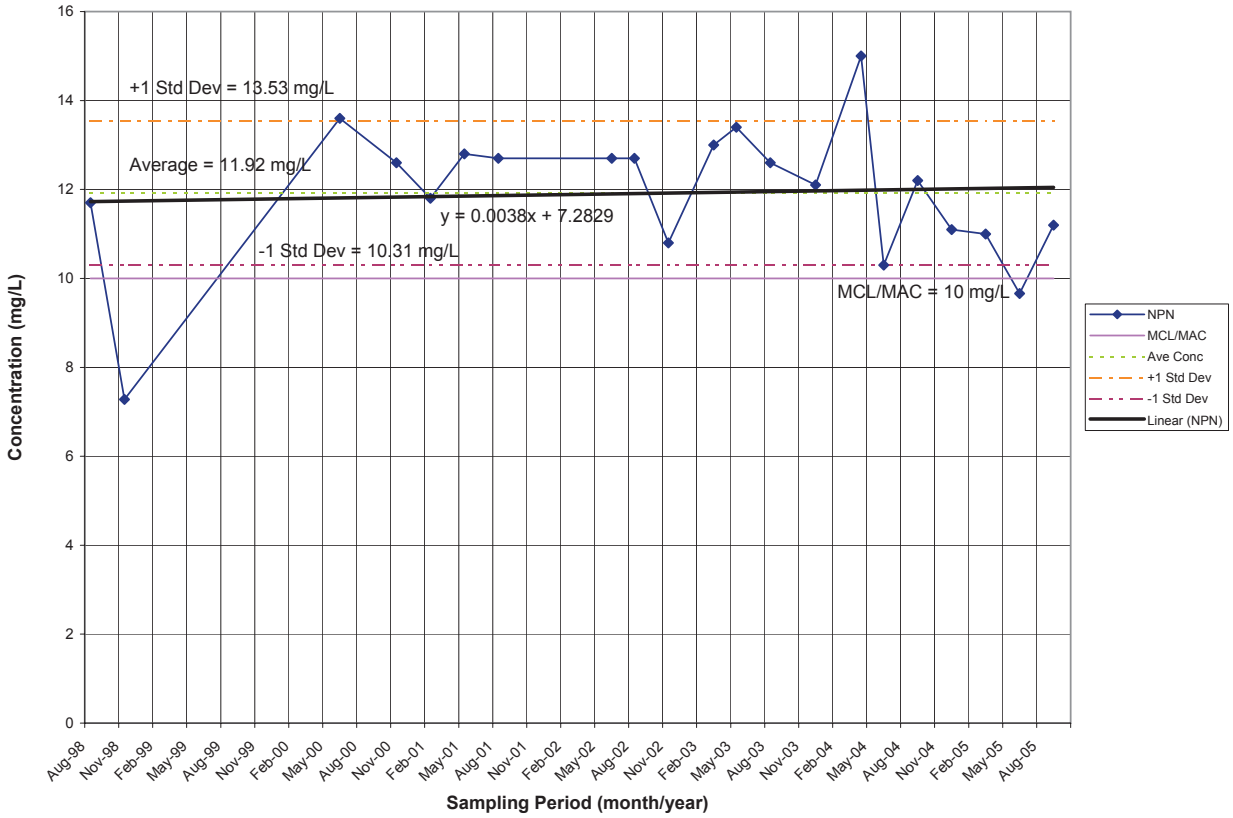


FIGURE B-11. Nitrate plus Nitrite Concentrations, LWDS-MW1

Tijeras Arroyo Groundwater Wells

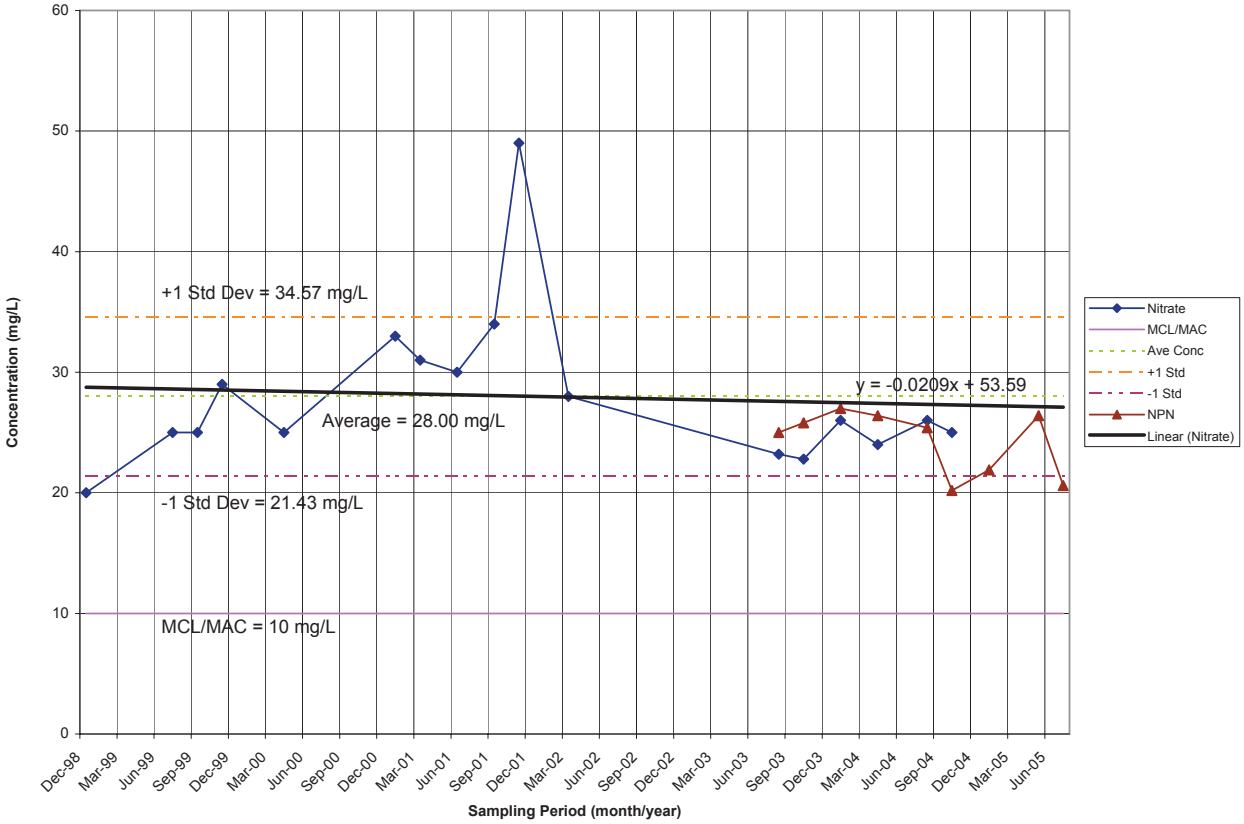


FIGURE B-12. Nitrate Concentrations, TJA-4

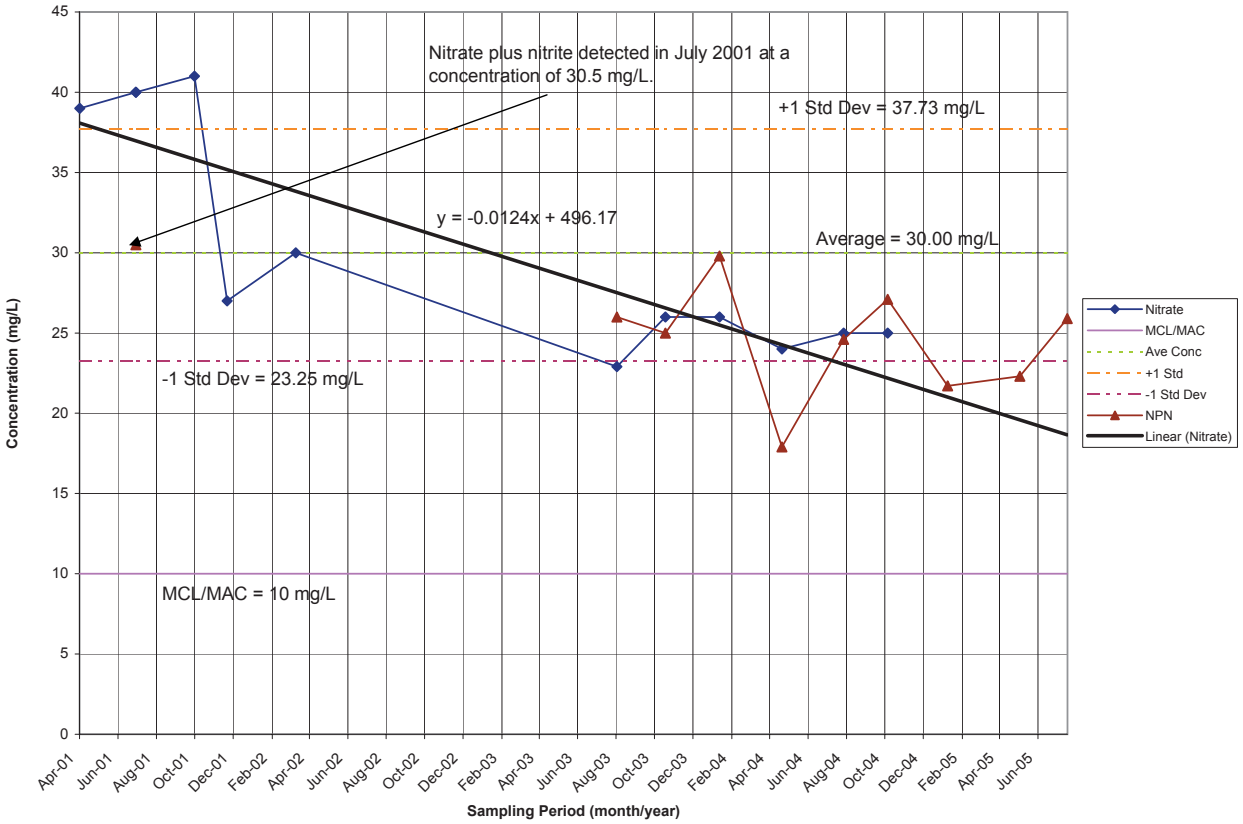


FIGURE B-13. Nitrate Concentrations, TJA-7

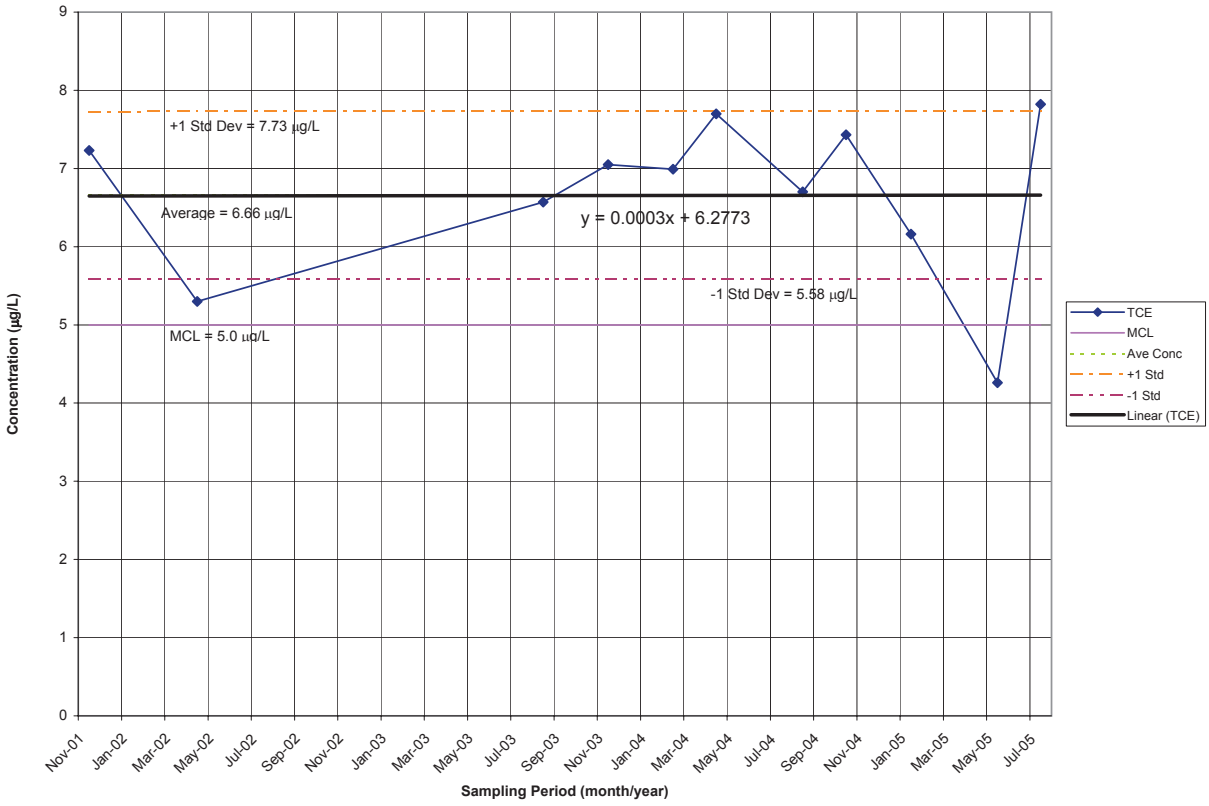


FIGURE B-14. Trichloroethene Concentrations, WYO-4

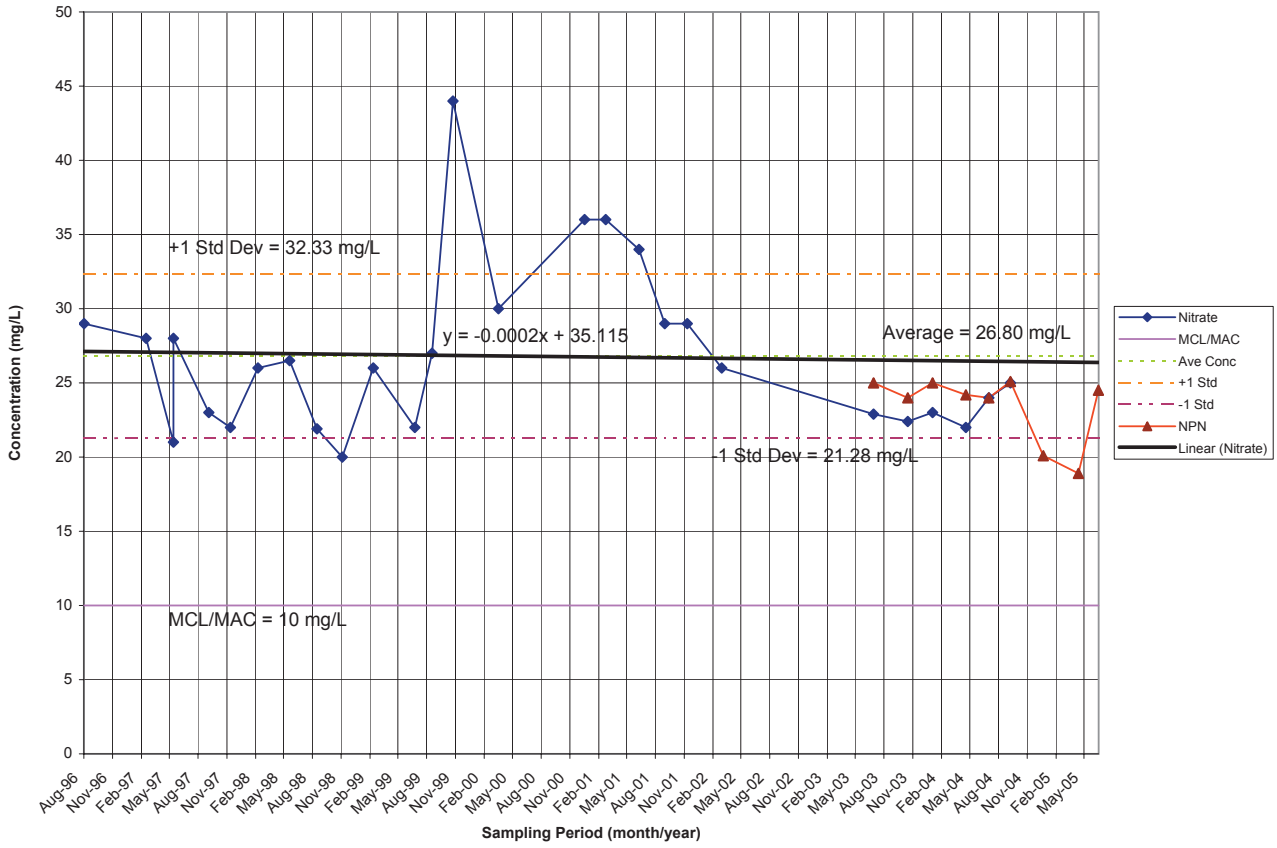


FIGURE B-15. Nitrate Concentrations, TA2-SW1-320

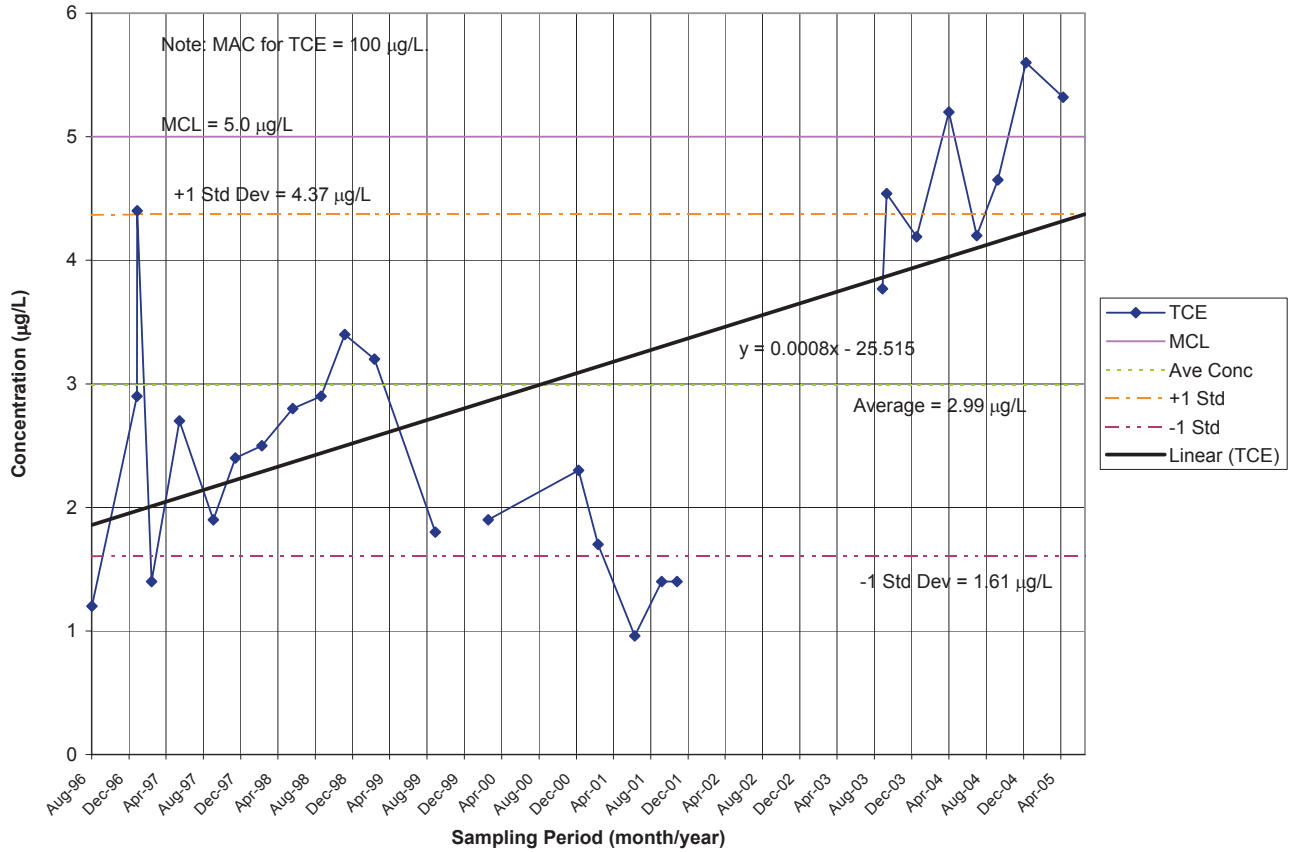


FIGURE B-16. Trichloroethene Concentrations, TA2-W-19

APPENDIX C
2005 TERRESTRIAL SURVEILLANCE RESULTS

This page intentionally left blank.

CONTENTS

TABLES

This page intentionally left blank.

C.1 Radiological Parameters:

Gamma-emitting radionuclides – Gamma spectroscopy is used to detect the emission of gamma radiation from radioactive materials. Radionuclide identification is possible by measuring the spectrum of gamma energies associated with a sample, since each radionuclide has a unique and consistent series of gamma emissions. Cesium–137 (Cs-137) is an example of a long-lived gamma emitter that is prevalent in the environment (as fallout from historical nuclear weapons testing) and is used as a possible indicator of environmental contamination from reactor facilities.

Tritium (H^3) radioisotope - H^3 is a radioactive isotope of hydrogen with a half-life of 12.5 years. Unlike the most common element of hydrogen ($_1H^1$), which has a single proton in its nucleus, H^3 contains one proton and two neutrons. Tritium occurs naturally at low levels in the environment, and as a result of fallout from past atmospheric nuclear weapons testing. It is also a possible contaminant associated with research and development (R&D).

Uranium – Uranium occurs naturally in soils, and may also be present as a pollutant in the environment, due to past testing conducted at SNL/NM. Total uranium (U_{tot}) analysis is used to measure all uranium isotopes present in a sample. A high U_{tot} measurement may trigger an isotope-specific analysis to determine the possible source of uranium (natural or man-made, enriched or depleted).

External gamma radiation exposure rates - Thermoluminescent dosimeters (TLDs) are used to measure ambient gamma exposure rates. Several natural gamma radiation sources exist, including cosmic radiation and radioactive materials that exist in geologic materials at SNL/NM. Many sources of man-made gamma radiation also exist at SNL/NM, such as reactor and accelerator facilities. The TLD network was established to determine the regional gamma exposure rate due to natural sources and to determine the impact, if any, of SNL/NM's operations on these levels. The dosimeters are placed on aluminum poles at a height of approximately one meter, and are exchanged and measured quarterly.

Non-Radiological parameters:

All metals, except for mercury, are determined using the Inductively Coupled Plasma-Atomic Emission Spectrum (ICP-AES) method. Mercury is determined by the Cold Vapor Atomic Absorption method.

Definitions:
The following terminology is utilized in the tables in this appendix:

Definitions for Radiological Analysis Tables
Decision Level (or Critical Level): The activity concentration above which a sample is considered to have activity above the instrument background at a prescribed level of confidence. The decision level is calculated such that there is a five percent probability of reporting a false positive result for a sample containing no activity.

Detection Limit (or Minimum Detectable Activity): The true activity concentration in a sample that, if present, can be detected (i.e., above the decision level) at a prescribed level of confidence. The detection limit is calculated such that there is a five percent probability of reporting a false negative result for a sample containing activity at the detection limit.

Definitions for Metals Tables
Decision Level (or Method Detection Limit): The lowest concentration at which a substance can be detected in a sample at a prescribed level of confidence.

Detection Limit (or Practical Quantification Limit): The lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

This page intentionally left blank.

TABLE C-1. Radiological Results by Location for Calendar Year 2005, Soil

Location Type	Location	Analyte	Units	Activity (± 2σ) and/or concentration		Decision Level	Detection Limit
Off-Site	8	Americium-241	pCi/g	0.0642 ± 0.065	U	0.054	0.11
	9		pCi/g	0.0395 ± 0.0616	U	0.054	0.11
	10		pCi/g	-0.0172 ± 0.0519	U	0.0479	0.097
	11		pCi/g	0.000418 ± 0.0106	U	0.009	0.018
	25		pCi/g	0.00285 ± 0.0122	U	0.0112	0.023
	62		pCi/g	0.0486 ± 0.0281	X	0.0218	0.044
	8	Cesium-137	pCi/g	0.022 ± 0.0181	X	0.0106	0.022
	9		pCi/g	0.255 ± 0.0372		0.0123	0.0255
	10		pCi/g	0.258 ± 0.0299		0.0112	0.023
	11		pCi/g	0.0532 ± 0.0135		0.00729	0.015
	25		pCi/g	0.0118 ± 0.0113	U	0.0101	0.0208
	62		pCi/g	0.324 ± 0.0476		0.0138	0.0285
	8	Tritium	pCi/g	-0.377 ± 2.45	U	2.09	4.52
	9		pCi/g	-1.18 ± 2.48	U	2.18	4.72
	10		pCi/L	4.78 ± 0.252	U	0.0852	0.177
	11		pCi/g	1.2 ± 2.87	U	2.37	4.91
	25		pCi/g	-1.56 ± 2.42	U	2.16	4.67
	62		pCi/g	1.15 ± 2.65	U	2.13	4.61
	8	Uranium	µg/g	0.563		0.00992	0.0397
	9		µg/g	0.44		0.00982	0.0393
	10		µg/g	0.348		0.00994	0.0398
	11		µg/g	0.556		0.00982	0.0393
	25		µg/g	0.51		0.00986	0.0394
	62		µg/g	0.973		0.00986	0.0394
On-Site	1	Americium-241	pCi/g	0.0363 ± 0.0673	U	0.0597	0.121
	2NE		pCi/g	-0.146 ± 0.0862	U	0.0674	0.137
	2NW		pCi/g	0.00986 ± 0.0237	U	0.023	0.047
	2SE		pCi/g	-0.0325 ± 0.0371	U	0.0336	0.068
	2SW		pCi/g	0.000919 ± 0.0182	U	0.0175	0.035
	3		pCi/g	-0.0301 ± 0.0785	U	0.0735	0.149
	6		pCi/g	0.0135 ± 0.0435	U	0.0351	0.071
	7		pCi/g	0.00943 ± 0.0117	U	0.0111	0.022
	20		pCi/g	0.0199 ± 0.0608	U	0.0523	0.106
	33		pCi/g	-0.0115 ± 0.0498	U	0.0417	0.085
	34		pCi/g	-0.0371 ± 0.0723	U	0.0573	0.117
	35		pCi/g	0.0315 ± 0.0216	U	0.018	0.037
	41		pCi/g	0.00254 ± 0.0149	U	0.0136	0.028
	42		pCi/g	0.0143 ± 0.0383	U	0.0356	0.072
	43		pCi/g	0.0104 ± 0.04	U	0.0338	0.069
	45		pCi/g	-0.17 ± 0.0675	U	0.0493	0.1
	46		pCi/g	-0.0277 ± 0.0534	U	0.0417	0.085
	49		pCi/g	0.0357 ± 0.0184	X	0.0154	0.031
	51		pCi/g	-0.0156 ± 0.0456	U	0.0369	0.075

See notes at end of table.

TABLE C-1. Radiological Results by Location for Calendar Year 2005, Soil (continued)

Location Type	Location	Analyte	Units	Activity (± 2 σ) and/or concentration		Decision Level	Detection Limit
On-Site	52	Americium-241	pCi/g	0.0309 ± 0.0282	U	0.0235	0.048
(continued)	53		pCi/g	-0.00551 ± 0.033	U	0.0309	0.063
	54		pCi/g	-0.127 ± 0.0597	U	0.046	0.093
	55		pCi/g	0.0219 ± 0.0207	U	0.0181	0.037
	57		pCi/g	0.0105 ± 0.0473	U	0.0431	0.088
	66		pCi/g	0.00718 ± 0.0488	U	0.042	0.085
	76		pCi/g	-0.0423 ± 0.0539	U	0.0491	0.099
	77		pCi/g	0.0718 ± 0.0754	U	0.0623	0.126
	78		pCi/g	0.0122 ± 0.0147	U	0.0116	0.024
	86		pCi/g	0.0155 ± 0.0332	U	0.0309	0.063
	1	Cesium-137	pCi/g	0.196 ± 0.0293		0.0118	0.0244
	2NE		pCi/g	0.109 ± 0.0231		0.0101	0.0208
	2NW		pCi/g	0.0938 ± 0.0172		0.00643	0.0132
	2SE		pCi/g	0.105 ± 0.0203		0.0079	0.0164
	2SW		pCi/g	0.215 ± 0.0308		0.0118	0.0242
	3		pCi/g	0.192 ± 0.0286		0.00948	0.0194
	6		pCi/g	0.265 ± 0.0184		0.00774	0.016
	7		pCi/g	0.3 ± 0.032		0.00922	0.019
	20		pCi/g	0.395 ± 0.0381		0.0084	0.017
	33		pCi/g	0.241 ± 0.0321		0.00987	0.0204
	34		pCi/g	0.175 ± 0.0251		0.0103	0.0212
	35		pCi/g	0.264 ± 0.0333		0.0118	0.0243
	41		pCi/g	0.114 ± 0.0221		0.00991	0.0205
	42		pCi/g	0.0489 ± 0.0147		0.00861	0.0178
	43		pCi/g	0.0514 ± 0.0166		0.00926	0.019
	45		pCi/g	0.076 ± 0.0269		0.0114	0.0235
	46		pCi/g	0.21 ± 0.0254		0.00974	0.0201
	49		pCi/g	0.44 ± 0.0432		0.01	0.0205
	51		pCi/g	-0.00904 ± 0.0107	U	0.0087	0.018
	52		pCi/g	0.0245 ± 0.0205	U	0.0135	0.0283
	53		pCi/g	0.17 ± 0.0209		0.00751	0.0154
	54		pCi/g	0.197 ± 0.0266		0.00986	0.0203
	55		pCi/g	0.504 ± 0.0292		0.0127	0.026
	57		pCi/g	0.0149 ± 0.00737		0.00678	0.0139
	66		pCi/g	0.134 ± 0.0203		0.00933	0.0193
	76		pCi/g	0.116 ± 0.0184		0.00966	0.0199
	77		pCi/g	0.0652 ± 0.0175		0.00932	0.0192
	78		pCi/g	0.383 ± 0.0394		0.00865	0.0178
	86		pCi/g	0.0387 ± 0.0314		0.0139	0.0287
	1	Tritium	pCi/g	-1.74 ± 12.2	U	10.3	21.3
	2NE		pCi/g	-0.515 ± 2.8	U	2.37	4.91
	2NW		pCi/g	-1.89 ± 2.72	U	2.35	4.88
	2SE		pCi/g	-0.852 ± 2.83	U	2.41	4.99

See notes at end of table.

TABLE C-1. Radiological Results by Location for Calendar Year 2005, Soil (continued)

Location Type	Location	Analyte	Units	Activity (± 2 σ) and/or concentration		Decision Level	Detection Limit
On-Site	2SW	Tritium	pCi/g	-0.0761 ± 2.82	U	2.37	4.91
(continued)	3		pCi/g	-1.91 ± 2.13	U	1.86	3.85
	6		pCi/L	0.955 ± 0.261		0.183	0.381
	7		pCi/g	0.895 ± 2.92	U	2.42	5.02
	20		pCi/g	1.14 ± 2.63	U	2.11	4.57
	33		pCi/g	-2.08 ± 2.27	U	1.98	4.1
	34		pCi/g	0.635 ± 1.81	U	1.49	3.11
	35		pCi/g	-2.88 ± 12.1	U	10.3	21.3
	41		pCi/g	-8.93 ± 12.6	U	10.9	22.7
	42		pCi/g	-9.56 ± 12.5	U	10.9	22.6
	43		pCi/g	-5.56 ± 11.5	U	9.88	20.5
	45		pCi/g	-1.18 ± 2.85	U	2.44	5.05
	46		pCi/g	-1.19 ± 2.5	U	2.19	4.75
	49		pCi/g	-0.268 ± 2.83	U	2.38	4.94
	51		pCi/L	0.118 ± 0.177	U	0.143	0.299
	52		pCi/g	0.655 ± 13.1	U	11	22.8
	53		pCi/g	-2.82 ± 11.9	U	10.1	20.9
	54		pCi/L	0.309 ± 0.238	U	0.188	0.391
	55		pCi/g	-15.7 ± 11.9	U	10.6	22.1
	57		pCi/g	-3.37 ± 2.25	U	2.02	4.18
	66		pCi/g	-5.06 ± 11	U	9.47	19.7
	76		pCi/g	-6.02 ± 12.5	U	10.7	22.2
	77		pCi/g	-8.75 ± 11.5	U	10	20.8
	78		pCi/g	-1.71 ± 11.9	U	10.1	20.9
	86		pCi/g	-0.389 ± 2.53	U	2.15	4.65
	1	Uranium	µg/g	0.563		0.00992	0.0397
	2NE		µg/g	0.372		0.00982	0.0393
	2NW		µg/g	0.301		0.00992	0.0397
	2SE		µg/g	0.296		0.00984	0.0394
	2SW		µg/g	0.278		0.0098	0.0392
	3		µg/g	0.438		0.0099	0.0396
	6		µg/g	0.36		0.00998	0.0399
	7		µg/g	0.429		0.00996	0.0398
	20		µg/g	0.566		0.0098	0.039
	33		µg/g	0.837		0.0098	0.0392
	34		µg/g	0.572		0.00988	0.0395
	35		µg/g	0.26		0.00992	0.0397
	41		µg/g	0.527		0.00988	0.0395
	42		µg/g	0.416		0.0098	0.0392
	43		µg/g	0.371		0.0099	0.0396
	45		µg/g	0.362		0.00994	0.0398
	46		µg/g	0.479		0.00994	0.0398
	49		µg/g	0.616		0.00992	0.0397

See notes at end of table.

TABLE C-1. Radiological Results by Location for Calendar Year 2005, Soil (continued)

Location Type	Location	Analyte	Units	Activity (± 2σ) and/or concentration		Decision Level	Detection Limit
On-Site	51	Uranium	µg/g	0.682		0.00996	0.0398
(concluded)	52		µg/g	0.349		0.00982	0.0393
	53		µg/g	0.277		0.0098	0.0392
	54		µg/g	0.348		0.00986	0.0394
	55		µg/g	0.546		0.0098	0.0392
	57		µg/g	0.93		0.0099	0.0396
	66		µg/g	0.387		0.00992	0.0397
	76		µg/g	0.38		0.00998	0.0399
	77		µg/g	0.3		0.00982	0.0393
	78		µg/g	0.246		0.00994	0.0398
	86		µg/g	0.741		0.0099	0.0396
Perimeter	4	Americium-241	pCi/g	-0.00818 ± 0.0499	U	0.0433	0.088
	5		pCi/g	0.0431 ± 0.0398	U	0.0358	0.073
	12		pCi/g	0.0334 ± 0.0368	U	0.035	0.071
	16		pCi/g	-0.0215 ± 0.0317	U	0.0297	0.06
	19		pCi/g	0.0279 ± 0.0508	U	0.0464	0.094
	58		pCi/g	0.00463 ± 0.0116	U	0.011	0.022
	59		pCi/g	-0.0487 ± 0.0453	U	0.0378	0.077
	60		pCi/g	-0.055 ± 0.042	U	0.0379	0.077
	61		pCi/g	0.0185 ± 0.0208	U	0.0169	0.034
	63		pCi/g	0.0533 ± 0.044		0.0231	0.047
	64		pCi/g	-0.0107 ± 0.03	U	0.018	0.036
	80		pCi/g	-0.00762 ± 0.05	U	0.0456	0.093
	81		pCi/g	0.0248 ± 0.0242	U	0.0187	0.038
	82		pCi/g	-0.0136 ± 0.042	U	0.0394	0.08
	4	Cesium-137	pCi/g	0.0562 ± 0.0129		0.00754	0.0155
	5		pCi/g	0.126 ± 0.0201		0.00793	0.0164
	12		pCi/g	0.492 ± 0.0446		0.00841	0.0174
	16		pCi/g	0.0657 ± 0.0381		0.013	0.0269
	19		pCi/g	0.165 ± 0.025		0.00967	0.02
	58		pCi/g	0.0339 ± 0.0122		0.00808	0.0167
	59		pCi/g	0.126 ± 0.0258		0.00992	0.0205
	60		pCi/g	0.0428 ± 0.0166		0.00946	0.0195
	61		pCi/g	0.0262 ± 0.0185		0.011	0.0227
	63		pCi/g	0.945 ± 0.085		0.0156	0.0322
	64		pCi/g	0.536 ± 0.0487		0.0116	0.0237
	80		pCi/g	0.283 ± 0.0263		0.00692	0.0143
	81		pCi/g	0.671 ± 0.0656		0.0128	0.0263
	82		pCi/g	0.0202 ± 0.0141		0.00964	0.0198

See notes at end of table.

TABLE C-1. Radiological Results by Location for Calendar Year 2005, Soil (concluded)

Location Type	Location	Analyte	Units	Activity (± 2 σ) and/or concentration		Decision Level	Detection Limit
Perimeter (concluded)	4	Tritium	pCi/g	-11.4 ± 11.8	U	10.3	21.4
	5		pCi/g	1.71 ± 12.1	U	10.1	21
	12		pCi/g	1.09 ± 2.06	U	1.68	3.5
	16		pCi/g	-2.48 ± 2.28	U	2.01	4.16
	19		pCi/g	-5.77 ± 11.8	U	10.1	21.1
	58		pCi/g	-0.0736 ± 2.72	U	2.29	4.74
	59		pCi/g	-1.53 ± 2.37	U	2.12	4.58
	60		pCi/g	0.427 ± 2.77	U	2.31	4.78
	61		pCi/g	-0.896 ± 2.79	U	2.37	4.92
	63		pCi/g	-2.44 ± 2.29	U	2.01	4.17
	64		pCi/g	-2.01 ± 2.03	U	1.78	3.69
	80		pCi/g	-2.27 ± 2.17	U	1.91	3.96
	81		pCi/g	-11.3 ± 11.6	U	10.2	21.2
	82		pCi/g	-1.17 ± 2.46	U	2.16	4.67
	4	Uranium	µg/g	0.255		0.00996	0.0398
	5		µg/g	0.176		0.01	0.04
	12		µg/g	0.589		0.00988	0.0395
	16		µg/g	1.72		0.00984	0.0394
	19		µg/g	0.307		0.01	0.04
	58		µg/g	0.904		0.00998	0.0399
	59		µg/g	0.603		0.00988	0.0395
	60		µg/g	0.573		0.01	0.04
	61		µg/g	0.51		0.00984	0.0394
	63		µg/g	0.619		0.00992	0.0397
	64		µg/g	1.38		0.00994	0.0398
	80		µg/g	0.709		0.00998	0.0399
	81		µg/g	0.277		0.00998	0.0399
	82		µg/g	0.754		0.00982	0.0393

NOTES: pCi/g = picocurie per gram
µg/g = microgram per gram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level. Some tritium results reported in pCi/g due to inadequate soil moisture to run standard analytical method (results are included for qualitative, not quantitative purposes).
X = Presumptive evidence that analyte is not present.

This page intentionally left blank.

TABLE C-2. Radiological Results by Location for Calendar Year 2005, Sediment

Location Type	Location	Analyte	Units	Activity (± 2σ) and/or Concentration		Decision Level	Detection Limit
Off-Site	8	Americium-241	pCi/g	0.0169 ± 0.0326	U	0.0312	0.0632
	11		pCi/g	-0.0708 ± 0.0632	U	0.0561	0.114
	68		pCi/g	0.0106 ± 0.0375	U	0.0345	0.0705
	8	Cesium-137	pCi/g	0.147 ± 0.0283		0.0079	0.0162
	11		pCi/g	0.0945 ± 0.026		0.0121	0.0249
	68		pCi/g	0.0251 ± 0.0209	X	0.00753	0.0158
	8	Tritium	pCi/L	0.564 ± 0.115		0.0763	0.159
	11		pCi/L	0.155 ± 0.12	U	0.0936	0.196
	68		pCi/L	0.0304 ± 0.0916	U	0.0757	0.157
	8	Uranium	ug/g	0.65		0.00994	0.0398
	11		ug/g	0.639		0.00998	0.0399
	68		ug/g	0.403		0.00988	0.0395
On-Site	56	Americium-241	pCi/g	0.0193 ± 0.0179	U	0.0152	0.0308
	72		pCi/g	-0.0669 ± 0.0893	U	0.0726	0.148
	74N		pCi/g	-0.0194 ± 0.0292	U	0.0279	0.0565
	75		pCi/g	0.0165 ± 0.048	U	0.0333	0.0676
	79		pCi/g	0.0108 ± 0.0159	U	0.0146	0.0296
	83		pCi/g	-0.151 ± 0.0698	U	0.052	0.105
	84		pCi/g	0.0146 ± 0.0196	U	0.0127	0.0257
	85		pCi/g	0.0144 ± 0.0187	U	0.0146	0.0298
	56	Cesium-137	pCi/g	0.0222 ± 0.0222		0.00969	0.02
	72		pCi/g	0.00924 ± 0.0177	U	0.0111	0.0229
	74N		pCi/g	0.0144 ± 0.0262	U	0.0124	0.0255
	75		pCi/g	0.00698 ± 0.00843	U	0.00887	0.0182
	79		pCi/g	0.173 ± 0.0274		0.0106	0.022
	83		pCi/g	0.182 ± 0.0282		0.0107	0.0221
	84		pCi/g	0.213 ± 0.0303		0.0107	0.022
	85		pCi/g	0.0148 ± 0.0178	U	0.0108	0.0225
	56	Tritium	pCi/g	2.51 ± 11.8	U	9.85	20.4
	72		pCi/g	1.53 ± 2.66	U	2.11	4.57
	74N		pCi/g	0.384 ± 2.57	U	2.13	4.6
	75		pCi/g	3.99 ± 2.94	U	2.33	4.83
	79		pCi/g	-2.7 ± 2.13	U	1.89	3.92
	83		pCi/g	0 ± 2.59	U	2.18	4.71
	84		pCi/g	-3.99 ± 11.7	U	9.99	20.8
	85		pCi/L	0.0126 ± 0.0937	U	0.0781	0.163
	56	Uranium	ug/g	0.411		0.0098	0.0392
	72		ug/g	0.689		0.0098	0.0392
	74N		ug/g	1.51		0.00998	0.0399
	75		ug/g	0.336		0.00994	0.0398
	79		ug/g	1.58		0.00988	0.0395
	83		ug/g	0.536		0.00988	0.0395
	84		ug/g	0.763		0.0098	0.0392
	85		ug/g	0.623		0.00998	0.0399

See notes at end of table.

TABLE C-2. Radiological Results by Location for Calendar Year 2005, Sediment (concluded)

Location Type	Location	Analyte	Units	Activity (± 2 σ) and/or Concentration		Decision Level	Detection Limit
Perimeter	60	Americium-241	pCi/g	-0.00131 ± 0.0197	U	0.0189	0.038
	73		pCi/g	-0.046 ± 0.0923	U	0.0798	0.162
	60	Cesium-137	pCi/g	-0.00241 ± 0.0141	U	0.0124	0.0254
	73		pCi/g	0.0111 ± 0.0227	U	0.00922	0.019
	60	Tritium	pCi/g	2.54 ± 3	U	2.43	5.03
	73		pCi/g	-1.92 ± 2.27	U	1.98	4.1
	60	Uranium	ug/g	1.03		0.00982	0.0393
	73		ug/g	0.711		0.00986	0.0394

NOTES: pCi/g = picocurie per gram
µg/g = microgram per gram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level. Some tritium results reported in pCi/g due to inadequate soil moisture to run standard analytical method (results are included for qualitative not quantitative purposes).
X = Presumptive evidence that analyte is not present.

TABLE C-3. Radiological Results by Location for Calendar Year 2005, Vegetation

Location Type	Location	Analyte	Units	Activity (± 2 σ) and/or Concentration		Decision Level	Detection Limit
Off-Site	8	Americium-241	pCi/g	-0.129 ± 0.223	U	0.153	0.324
	9			0.0346 ± 0.0994	U	0.0778	0.163
	11			0.256 ± 0.534	U	0.35	0.723
	25			-0.025 ± 0.103	U	0.0784	0.164
	62			0.0274 ± 0.122	U	0.0946	0.198
	8	Cesium-137	pCi/g	0.00663 ± 0.0363	U	0.0296	0.0652
	9			0.0284 ± 0.034	U	0.0227	0.0491
	11			0.0519 ± 0.154	U	0.122	0.255
	25			0.00285 ± 0.0378	U	0.0305	0.0648
	62			0.038 ± 0.0337	U	0.0299	0.0649
	8	Tritium	pCi/L	1.97 ± 0.201		0.108	0.224
	9			-0.00819 ± 0.128	U	0.108	0.224
	11			0.0795 ± 0.127	U	0.103	0.216
	25			0.0399 ± 0.127	U	0.105	0.219
	62			4.72 ± 0.28		0.109	0.226
	8	Uranium	ug/g	0.0162	J	0.00988	0.0395
	9			0.00994	U	0.00994	0.0398
	11			0.00996	U	0.00996	0.0398
	25			0.00988	U	0.00988	0.0395
	62			0.00982	U	0.00982	0.0393
On-Site	2NE	Americium-241	pCi/g	0.0826 ± 0.122	U	0.0909	0.191
	2NW			-0.0454 ± 0.138	U	0.101	0.212
	6			-0.0595 ± 0.123	U	0.079	0.161
	20			0.0464 ± 0.108	U	0.0728	0.15
	33			0.0666 ± 0.0982	U	0.0619	0.127
	34			0.125 ± 0.361	U	0.239	0.489
	35			0.186 ± 0.264	U	0.168	0.344
	43			0.0177 ± 0.0631	U	0.0393	0.0796
	45			-0.158 ± 0.209	U	0.133	0.277
	46			0.0103 ± 0.0573	U	0.0454	0.093
	51			-0.0119 ± 0.0511	U	0.0382	0.0775
	52			-0.0266 ± 0.0528	U	0.041	0.0839
	55			-0.0316 ± 0.11	U	0.078	0.159
	86			0.0537 ± 0.0709	U	0.0539	0.11
	2NE	Cesium-137	pCi/g	0.00294 ± 0.0386	U	0.0318	0.0687
	2NW			0.0017 ± 0.0388	U	0.0308	0.0675
	6			0.00515 ± 0.0262	U	0.0213	0.0443
	20			0.0143 ± 0.0194	U	0.0161	0.0336
	33			0.0313 ± 0.0757	U	0.06	0.126
	34			0.00532 ± 0.068	U	0.0521	0.108
	35			0.00642 ± 0.0616	U	0.049	0.102
	43			0.00883 ± 0.0461	U	0.0373	0.0767
	45			0.0273 ± 0.0476	U	0.0396	0.0852
	46			0.0353 ± 0.0195		0.0145	0.0303
	51			-0.00538 ± 0.0449	U	0.0362	0.0743
	52			0.0086 ± 0.0109	U	0.0133	0.0276
	55			0.0176 ± 0.0286	U	0.0236	0.0489
	86			0.000528 ± 0.0188	U	0.0154	0.032

See notes at end of table.

TABLE C-3. Radiological Results by Location for Calendar Year 2005, Vegetation (continued)

Location Type	Location	Analyte	Units	Activity (± 2 σ) and/or Concentration		Decision Level	Detection Limit
On-Site	2NE	Tritium	pCi/L	15.6 ± 0.531		0.103	0.214
(continued)	2NW			1.97 ± 0.205		0.104	0.218
	6			0.0775 ± 0.132	U	0.107	0.223
	20			0.00273 ± 0.129	U	0.108	0.225
	33			0.0778 ± 0.135	U	0.11	0.229
	34			7.69 ± 0.367		0.115	0.239
	35			1.27 ± 0.177		0.107	0.222
	43			0.0769 ± 0.131	U	0.107	0.222
	45			0.16 ± 0.132	U	0.104	0.216
	46			0.121 ± 0.133	U	0.107	0.222
	51			0.193 ± 0.137	U	0.107	0.223
	52			0.116 ± 0.134	U	0.107	0.224
	55			0.0784 ± 0.133	U	0.109	0.226
	86			0.0211 ± 0.125	U	0.104	0.217
	2NE	Uranium	ug/g	0.01	U	0.01	0.04
	2NW			0.0139	J	0.00994	0.0398
	6			0.00996	U	0.00996	0.0398
	20			0.0131	J	0.0099	0.0396
	33			0.00998	U	0.00998	0.0399
	34			0.0099	U	0.0099	0.0396
	35			0.00982	U	0.00982	0.0393
	43			0.0173	J	0.00996	0.0398
	45			0.0163	J	0.00984	0.0394
	46			0.0199	J	0.00996	0.0398
	51			0.0241	J	0.0098	0.0392
	52			0.0098	U	0.0098	0.0392
	55			0.0146	J	0.01	0.04
	86			0.00984	U	0.00984	0.0394
Perimeter	4	Americium-241	pCi/g	0.0312 ± 0.241	U	0.124	0.255
	5			-0.00319 ± 0.0841	U	0.0518	0.106
	19			0.188 ± 0.175	U	0.121	0.249
	60			-0.213 ± 0.229	U	0.157	0.321
	63			-0.123 ± 0.148	U	0.102	0.21
	64			-0.0382 ± 0.0453	U	0.0344	0.0699
	82			-0.106 ± 0.085	U	0.0549	0.113
	4	Cesium-137	pCi/g	0.0125 ± 0.0543	U	0.0434	0.0905
	5			0.0631 ± 0.066	U	0.0537	0.112
	19			0.0184 ± 0.0814	U	0.0371	0.078
	60			0.0824 ± 0.168	U	0.134	0.283
	63			0.0413 ± 0.0497	U	0.0401	0.0832
	64			0.00646 ± 0.0379	U	0.0311	0.0642
	82			-0.00238 ± 0.0208	U	0.0169	0.0353

See notes at end of table.

TABLE C-3. Radiological Results by Location for Calendar Year 2005, Vegetation (concluded)

Location Type	Location	Analyte	Units	Activity (± 2 σ) and/or Concentration		Decision Level	Detection Limit
Perimeter	4	Tritium	pCi/L	-0.0112 ± 0.131	U	0.111	0.229
(concluded)	5			0.0347 ± 0.128	U	0.106	0.22
	19			0.231 ± 0.139		0.108	0.224
	60			0.118 ± 0.128	U	0.103	0.214
	63			0.275 ± 0.158		0.122	0.254
	64			0.149 ± 0.143	U	0.114	0.237
	82			0.0992 ± 0.134	U	0.109	0.227
	4	Uranium	ug/g	0.0098	U	0.0098	0.0392
	5			0.01	U	0.01	0.04
	19			0.0112	J	0.0098	0.0392
	60			0.00988	U	0.00988	0.0395
	63			0.00988	U	0.00988	0.0395
	64			0.01	U	0.01	0.04
	82			0.0127	J	0.0099	0.0396

NOTES: pCi/g = picocurie per gram
pCi/mL = picocurie per milliliter
µg/g = microgram per gram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.

This page intentionally left blank.

TABLE C-4. Radiological Replicate Results for Calendar Year 2005, Soil

Location Type	Location	Sample ID	Analyte	Units	Activity (± 2 σ) and/or Concentration		Decision Level	Detection Limit	Average	Std Dev	CV
Off-Site	11	068641-001	Americium-241	pCi/g	0.000418 ± 0.0106	U	0.00901	0.0183			
		068641-002	Americium-241	pCi/g	-0.0343 ± 0.0597	U	0.048	0.0979	N/A	N/A	N/A
		068641-003	Americium-241	pCi/g	0.00688 ± 0.0379	U	0.0362	0.0736			
		068641-001	Cesium-137	pCi/g	0.0532 ± 0.0135		0.00729	0.015			
		068641-002	Cesium-137	pCi/g	0.0571 ± 0.0154		0.00783	0.0162	0.05	0.01	24.09%
		068641-003	Cesium-137	pCi/g	0.0352 ± 0.0191		0.0092	0.019			
		068641-001	Tritium	pCi/g	1.2 ± 2.87	U	2.37	4.91			
		068641-002	Tritium	pCi/g	0.835 ± 2.91	U	2.42	5.01	N/A	N/A	N/A
		068641-003	Tritium	pCi/g	-0.702 ± 2.57	U	2.18	4.52			
		068641-001	Uranium	µg/g	0.556		0.00982	0.0393			
		068641-002	Uranium	µg/g	0.721		0.00988	0.0395	0.61	0.09	15.37%
		068641-003	Uranium	µg/g	0.56		0.00982	0.0393			
Perimeter	64	068606-001	Americium-241	pCi/g	-0.0107 ± 0.03	U	0.018	0.0364			
		068606-002	Americium-241	pCi/g	-0.0189 ± 0.0501	U	0.0442	0.0897	N/A	N/A	N/A
		068606-003	Americium-241	pCi/g	-0.0377 ± 0.04	U	0.0374	0.0758			
		068606-001	Cesium-137	pCi/g	0.536 ± 0.0487		0.0116	0.0237			
		068606-002	Cesium-137	pCi/g	0.151 ± 0.0174		0.00708	0.0145	0.33	0.19	59.87%
		068606-003	Cesium-137	pCi/g	0.29 ± 0.0292		0.00838	0.0173			
		068606-001	Tritium	pCi/g	-2.01 ± 2.03	U	1.78	3.69			
		068606-002	Tritium	pCi/g	-1.64 ± 2.18	U	1.89	3.92	N/A	N/A	N/A
		068606-003	Tritium	pCi/g	-1.78 ± 1.87	U	1.64	3.43			
		068606-001	Uranium	µg/g	1.38		0.00994	0.0398			
		068606-002	Uranium	µg/g	1.09		0.0098	0.0392	1.06	0.34	31.76%
		068606-003	Uranium	µg/g	0.709		0.00996	0.0398			
On-Site	2 NE	068563-001	Americium-241	pCi/g	-0.146 ± 0.0862	U	0.0674	0.137			
		068563-002	Americium-241	pCi/g	-0.0132 ± 0.0555	U	0.0501	0.102	N/A	N/A	N/A
		068563-003	Americium-241	pCi/g	0.0383 ± 0.0243	U	0.0441	0.0898			
		068563-001	Cesium-137	pCi/g	0.109 ± 0.0231		0.0101	0.0208			
		068563-002	Cesium-137	pCi/g	0.15 ± 0.0227		0.00969	0.02	0.13	0.02	16.64%
		068563-003	Cesium-137	pCi/g	0.121 ± 0.0174		0.00739	0.0153			
		068563-001	Tritium	pCi/g	-0.515 ± 2.8	U	2.37	4.91			
		068563-002	Tritium	pCi/g	-0.0785 ± 2.9	U	2.44	5.06	N/A	N/A	N/A
		068563-003	Tritium	pCi/g	-0.767 ± 2.81	U	2.38	4.94			
		068563-001	Uranium	µg/g	0.372		0.00982	0.0393			
		068563-002	Uranium	µg/g	0.514		0.00992	0.0397	0.42	0.08	19.06%
		068563-003	Uranium	µg/g	0.378		0.00998	0.0399			
	20	068622-001	Americium-241	pCi/g	0.0199 ± 0.0608	U	0.0523	0.106			
		068622-002	Americium-241	pCi/g	0.02 ± 0.0456	U	0.0388	0.0788	N/A	N/A	N/A
		068622-003	Americium-241	pCi/g	-0.000626 ± 0.0284	U	0.0272	0.0551			
		068622-001	Cesium-137	pCi/g	0.395 ± 0.0381		0.00842	0.0174			
		068622-002	Cesium-137	pCi/g	0.387 ± 0.0398		0.00956	0.0197	0.45	0.10	21.83%
		068622-003	Cesium-137	pCi/g	0.56 ± 0.0588		0.00742	0.0152			
		068622-001	Tritium	pCi/g	1.14 ± 2.63	U	2.11	4.57			
		068622-002	Tritium	pCi/g	-0.406 ± 2.64	U	2.25	4.86	N/A	N/A	N/A
		068622-003	Tritium	pCi/g	1.92 ± 2.71	U	2.13	4.6			
		068622-001	Uranium	µg/g	0.566		0.00984	0.0394			
		068622-002	Uranium	µg/g	0.531		0.0098	0.0392	0.58	0.06	10.41%
		068622-003	Uranium	µg/g	0.649		0.0099	0.0396			

See notes at end of table.

TABLE C-4. Radiological Replicate Results for Calendar Year 2005, Soil (concluded)

Location Type	Location	Sample ID	Analyte	Units	Activity (± 2 σ) and/or Concentration		Decision Level	Detection Limit	Average	Std Dev	CV
On-Site	33	068595-001	Americium-241	pCi/g	-0.0115 ± 0.0498	U	0.0417	0.0849			
		068595-002	Americium-241	pCi/g	-0.00972 ± 0.0648	U	0.0571	0.116	N/A	N/A	N/A
		068595-003	Americium-241	pCi/g	0.0111 ± 0.0456	U	0.0417	0.0847			
		068595-001	Cesium-137	pCi/g	0.241 ± 0.0321		0.00987	0.0204			
		068595-002	Cesium-137	pCi/g	0.14 ± 0.0267		0.0119	0.0246	0.19	0.05	26.21%
		068595-003	Cesium-137	pCi/g	0.202 ± 0.0251		0.0105	0.0217			
		068595-001	Tritium	pCi/g	-2.08 ± 2.27	U	1.98	4.1			
		068595-002	Tritium	pCi/g	-1.76 ± 2.28	U	1.98	4.1	N/A	N/A	N/A
		068595-003	Tritium	pCi/g	-2.96 ± 2.44	U	2.15	4.47			
		068595-001	Uranium	µg/g	0.837		0.0098	0.0392			
		068595-002	Uranium	µg/g	0.813		0.00988	0.0395	0.80	0.05	5.98%
		068595-003	Uranium	µg/g	0.745		0.01	0.04			
	53	068558-001	Americium-241	pCi/g	-0.00551 ± 0.033	U	0.0309	0.0627			
		068558-002	Americium-241	pCi/g	-0.00127 ± 0.0164	U	0.0154	0.0311	N/A	N/A	N/A
		068558-003	Americium-241	pCi/g	0.0396 ± 0.017	X	0.0143	0.0288			
		068558-001	Cesium-137	pCi/g	0.17 ± 0.0209		0.00751	0.0154			
		068558-002	Cesium-137	pCi/g	0.179 ± 0.0275		0.011	0.0225	0.17	0.01	3.19%
		068558-003	Cesium-137	pCi/g	0.169 ± 0.0251		0.00907	0.0186			
		068558-001	Tritium	pCi/g	-2.82 ± 11.9	U	10.1	20.9			
		068558-002	Tritium	pCi/g	-2.52 ± 11.7	U	9.91	20.6	N/A	N/A	N/A
		068558-003	Tritium	pCi/g	-5.5 ± 12	U	10.3	21.3			
		068558-001	Uranium	µg/g	0.277		0.0098	0.0392			
		068558-002	Uranium	µg/g	0.302		0.00984	0.0394	0.32	0.05	16.33%
		068558-003	Uranium	µg/g	0.377		0.00996	0.0398			

NOTES: pCi/g = picocurie per gram
pCi/mL = picocurie per milliliter
µg/g = microgram per gram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level. Tritium results reported in pCi/g due to inadequate soil moisture to run standard analytical method (results are included for qualitative, not quantitative purposes).
. CV = coefficient of variation
Std Dev = standard deviation
X = Presumptive evidence that analyte is not present.
N/A = Statistics are not calculated when all reported results are no-detects

TABLE C-5. Radiological Replicate Results for Calendar Year 2005, Sediment

Location Type	Location	Sample ID	Analyte	Units	Activity (± 2 σ) and/or Concentration		Decision Level	Detection Limit	Average	Std Dev	CV
Off-Site	11	068643-001	Americium-241	pCi/g	-0.0708 ± 0.0632	U	0.0561	0.114			
		068643-002	Americium-241	pCi/g	0.025 ± 0.0243	U	0.0194	0.0393	N/A	N/A	N/A
		068643-003	Americium-241	pCi/g	0.0625 ± 0.0522	U	0.0433	0.0878			
		068643-001	Cesium-137	pCi/g	0.0945 ± 0.026		0.0121	0.0249			
		068643-002	Cesium-137	pCi/g	0.131 ± 0.0253		0.0119	0.0246	0.11	0.02	19.15%
		068643-003	Cesium-137	pCi/g	0.0964 ± 0.0242		0.0121	0.0249			
		068643-001	Tritium	pCi/L	0.155 ± 0.12	U	0.0936	0.196			
		068643-002	Tritium	pCi/L	3.38 ± 0.241		0.0941	0.197	1.96	2.01	102.52%
		068643-003	Tritium	pCi/L	0.539 ± 0.138		0.0932	0.195			
		068643-001	Uranium	µg/g	0.639		0.00998	0.0399			
		068643-002	Uranium	µg/g	0.564		0.00986	0.0394	0.60	0.04	6.23%
		068643-003	Uranium	µg/g	0.604		0.0098	0.0392			
On-Site	74 N	068610-001	Americium-241	pCi/g	-0.0194 ± 0.0292	U	0.0279	0.0565			
		068610-002	Americium-241	pCi/g	-0.0105 ± 0.0428	U	0.0391	0.0795	N/A	N/A	N/A
		068610-003	Americium-241	pCi/g	0.0036 ± 0.0646	U	0.0551	0.112			
		068610-001	Cesium-137	pCi/g	0.0144 ± 0.0262	U	0.0124	0.0255			
		068610-002	Cesium-137	pCi/g	0.00338 ± 0.0101	U	0.00907	0.0187	N/A	N/A	N/A
		068610-003	Cesium-137	pCi/g	0.0181 ± 0.0146	U	0.0107	0.022			
		068610-001	Tritium	pCi/g	0.384 ± 2.57	U	2.13	4.6			
		068610-002	Tritium	pCi/g	2.31 ± 2.76	U	2.13	4.61	N/A	N/A	N/A
		068610-003	Tritium	pCi/g	-1.16 ± 2.43	U	2.14	4.62			
		068610-001	Uranium	µg/g	1.51		0.00998	0.0399			
		068610-002	Uranium	µg/g	0.95		0.00986	0.0394	1.16	0.31	26.58%
		068610-003	Uranium	µg/g	1.01		0.00996	0.0398			

NOTES: pCi/g = picocurie per gram
pCi/mL = picocurie per milliliter
µg/g = microgram per gram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level. Tritium results reported in pCi/g due to inadequate soil moisture to run standard analytical method (results are included for qualitative, not quantitative purposes).
CV = coefficient of variation
Std Dev = standard deviation
N/A = Statistics are not calculated when all reported results are no-detects

This page intentionally left blank.

TABLE C-6. Radiological Replicate Results for Calendar Year 2005, Vegetation

Location Type	Location	Sample ID	Analyte	Units	Activity (± 2 σ) and/or Concentration		Decision Level	Detection Limit	Average	Std Dev	CV
Off-Site	11	068642-001	Americium-241	pCi/g	0.256 ± 0.534	U	0.35	0.723	N/A	N/A	N/A
		068642-002	Americium-241	pCi/g	-0.0243 ± 0.144	U	0.104	0.216			
		068642-003	Americium-241	pCi/g	-0.0341 ± 0.0807	U	0.0563	0.119			
		068642-001	Cesium-137	pCi/g	0.0519 ± 0.154	U	0.122	0.255	N/A	N/A	N/A
		068642-002	Cesium-137	pCi/g	0.318 ± 0.221	X	0.0946	0.2			
		068642-003	Cesium-137	pCi/g	-0.0192 ± 0.0671	U	0.0528	0.116			
		068642-001	Tritium	pCi/L	0.0795 ± 0.127	U	0.103	0.216	N/A	N/A	N/A
		068642-002	Tritium	pCi/L	0.0804 ± 0.129	U	0.105	0.218			
		068642-003	Tritium	pCi/L	0.0773 ± 0.124	U	0.101	0.21			
		068642-001	Uranium	µg/g	0.00996	U	0.00996	0.0398	N/A	N/A	N/A
		068642-002	Uranium	µg/g	0.01	U	0.01	0.04			
		068642-003	Uranium	µg/g	0.0099	U	0.0099	0.0396			
On-Site	33	068596-001	Americium-241	pCi/g	0.0666 ± 0.0982	U	0.0619	0.127	N/A	N/A	N/A
		068596-002	Americium-241	pCi/g	0.00999 ± 0.0707	U	0.0477	0.0984			
		068596-003	Americium-241	pCi/g	-0.000261 ± 0.116	U	0.0778	0.16			
		068596-001	Cesium-137	pCi/g	0.0313 ± 0.0757	U	0.06	0.126	N/A	N/A	N/A
		068596-002	Cesium-137	pCi/g	0.0437 ± 0.1	U	0.0792	0.166			
		068596-003	Cesium-137	pCi/g	0.117 ± 0.136	U	0.113	0.237			
		068596-001	Tritium	pCi/L	0.0778 ± 0.135	U	0.11	0.229	1.15	1.26	109.34%
		068596-002	Tritium	pCi/L	2.04 ± 0.208		0.109	0.227			
		068596-003	Tritium	pCi/L	0.261 ± 0.139		0.107	0.221			
		068596-001	Uranium	µg/g	0.00998	U	0.00998	0.0399	N/A	N/A	N/A
		068596-002	Uranium	µg/g	0.00988	U	0.00988	0.0395			
		068596-003	Uranium	µg/g	0.00998	U	0.00998	0.0399			

NOTES: pCi/g = picocurie per gram
pCi/mL = picocurie per milliliter
µg/g = microgram per gram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level.
CV = coefficient of variation
Std Dev = standard deviation
X = Presumptive evidence that analyte is not present.
N/A = Statistics are not calculated when all reported results are no-detects

This page intentionally left blank.

TABLE C-7. Non-Radiological Replicate Results for Special Sampling for Calendar Year 2005, Soil
(All results reported in milligrams per kilogram [mg/L] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result	Decision Level	Detection Limit	Average	Std Dev	CV
On-Site	20	068622-001	Antimony	0.977	0.04	0.1	0.64	0.29	45.36%
		068622-002	Antimony	0.493	0.04	0.1			
		068622-003	Antimony	0.455	0.04	0.1			
		068622-001	Lead, TCLP	24.9	0.025	0.1	15.99	7.94	49.65%
		068622-002	Lead, TCLP	13.4	0.025	0.1			
		068622-003	Lead, TCLP	9.67	0.025	0.1			

NOTES: B =The analyte was found in the blank above the effective decision level (organics), or the effective detection limit (inorganics).

J = Estimated value, the analyte concentration fell above the effective decision level and below the effective detection limit.

U =The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level.

CV = coefficient of variation

Std Dev = standard deviation

This page intentionally left blank.

TABLE C-8. TLD Measurements by Quarter and Location Class for Calendar Year, 2005

Location Class	Location Number	1st Quarter (91 Days)		2nd Quarter (87 Days)		3rd Quarter (103 Days)		4th Quarter (96 Days)		Exposure Rate	
		Exposure (mR)	Error	Exposure (mR)	Error	Exposure (mR)	Error	Exposure (mR)	Error	uR per hour	Error
Off-Site	10	30.6	1.6	27.2	1.8	30.4	1.2	34.7	0.8	13.58	0.31
	11	24.7	1.6	19.5	1.8	20.1	1.6	27.1	1.3	10.10	0.35
	21	28.3	1.8	23.8	2	24.1	0.8	29.1	2	11.64	0.38
	22	25.3	1.6	21.3	2.1	22.6	0.8	30.8	0.9	11.05	0.32
	23	26.3	1.8	21.8	1.8	22.4	0.8	28.4	1.9	10.93	0.36
	24	24.7	1.6	20.9	1.9	19.6	1	23.9	0.4	9.85	0.30
	25	25.7	1.7	23	2.4	22	1	26.5	0.4	10.74	0.35
	26	32.3	1.7	29.4	2.1	53.1	41	32.8	1.8	16.31	4.55
	27	27.7	2.1	24.5	2	23.7	1	29	1.9	11.59	0.40
	28	26.1	1.9	21.7	2	22.1	0.8	25.7	0.6	10.57	0.32
	29	25.3	1.7	19.8	2	20.4	1.4	25.6	3.1	10.07	0.47
	30	32	2.8	27.2	1.9	26	1	30.8	1.2	12.82	0.41
Perimeter	4	28	2.1	28.1	1.3	23.8	0.7	27.7	0.5	11.89	0.29
	5	24.8	0.8	25.9	1	21.6	0.5	25.6	1.2	10.82	0.20
	16	36.8	2.5	32.9	1	28.3	2.8	34.2	2.4	14.61	0.50
	18	28.1	1	27.6	1.3	23.7	0.5	28.3	1.4	11.90	0.24
	19	29.5	0.8	29.7	1.5	25.9	0.8	29.6	1	12.68	0.24
	39	26.9	0.9	27.7	1.3	23.2	1.1	26.6	1.3	11.54	0.26
	40	26.8	1	26.8	1.1	21.6	0.6	27.7	1	11.37	0.21
	81	28.7	0.9	28.9	1	24.7	1	29.5	0.8	12.36	0.21
On-Site	1	28.2	1.3	29.8	1	23	2.5	28.9	0.9	12.15	0.35
	2NW	26.5	0.8	26.8	1.1	20.5	0.5	26.2	0.9	11.05	0.19
	3	27.3	0.7	28.7	2	23.6	1.3	27.4	0.8	11.83	0.29
	6	28	1.4	27.7	1.1	22.5	0.8	26.6	0.5	11.58	0.22
	7	29	1.1	29.3	1.1	24.9	0.4	29.5	1.5	12.46	0.24
	20	29.5	0.7	30.3	1.2	24.7	0.4	28.8	1	12.52	0.19
	31	26.6	0.8	27	1.1	21.5	0.9	26.2	1.2	11.20	0.22
	41	29.1	0.7	26.6	1.1	23	0.5	28.7	2.5	11.87	0.32
	42	26.9	0.7	26.6	1.2	21.6	0.5	26.5	0.9	11.23	0.19
	43	27.4	0.7	27.5	1.2	22	0.8	26.8	1.9	11.46	0.27
	46	28.8	0.7	28.8	1	23.8	1.6	28.2	0.6	12.11	0.23
	47	27.6	0.9	28.1	1.1	24.6	0.5	27.3	1.3	11.89	0.22
	48	30.4	1.5	30.8	1.8	26.6	1.1	29.5	1	12.96	0.31
	66	28.3	0.7	28.2	1.4	24.7	0.7	28.5	0.4	12.12	0.19
Operational	45	33.3	0.8	29.3	1.3	22.5	0.5	28.5	0.6	12.56	0.19
	45E	30.1	1	28.9	1	33.2	16	29.4	1.2	13.44	1.78

NOTES: mR = Milliroentgen (10^{-3} roentgen); uR = microroentgen (10^{-6} roentgen)
"Operational" refers to TLD locations that are near ongoing operations that may influence readings, such that they may not truly reflect "environmental" conditions.

This page intentionally left blank.

TABLE C-9. Summary TLD Results for Calendar Year 2005, SNL/NM

Location Class	Number of Locations	Mean Exposure Rate (uR/hour)	Median Exposure Rate (uR/hour)	Std Dev.	Minimum	Maximum
Community	12	11.6	11.0	1.9	9.9	16.3
Perimeter	8	12.2	11.9	1.2	10.8	14.6
On-Site	14	11.9	11.9	0.6	11.1	13.0
Operational	2	13.0	13.0	0.6	12.6	13.4

NOTES: uR = microroentgen (10^{-6} roentgen)
"Operational" refers to TLD locations that are near ongoing operations that may influence readings, such that they may not truly reflect "environmental" conditions.

This page intentionally left blank.

GLOSSARY

Photo by:
Randall M. Roberts

This page intentionally left blank.

A

Abatement – Reducing the degree or intensity of, or eliminating, pollution.

Absorbent material – a material having capacity or tendency to absorb another substance.

Absorption – The uptake of water, other fluids, or dissolved chemicals by a cell or an organism (as tree roots absorb dissolved nutrients in soil.)

Alluvial – Relating to and/or sand deposited by flowing water.

Ambient Air – Any unconfined portion of the atmosphere: open air, surrounding air.

Analyte – A substance or chemical constituent that is undergoing analysis.

Antimony – A metallic element having four allotropic forms, the most common of which is a hard, extremely brittle, lustrous, silver-white, crystalline material. It is used in a wide variety of alloys, especially with lead in battery plates, and in the manufacture of flame-proofing compounds, paint, semiconductor devices, and ceramic products.

Appraisal – A documented activity performed according to written procedures and specified criteria to evaluate the compliance and conformance of an organization with programs, standards, and other requirements contained in orders, laws, and regulations, or other requirements invoked by SNL.

Aquifer – An underground geological formation, or group of formations, containing water. Are sources of groundwater for wells and springs.
Arroyo – A deep gully cut by an intermittent stream; a dry gulch.

Asbestos – A mineral fiber that can pollute air or water and cause cancer or asbestosis when inhaled. Uses for asbestos-containing material include, but are not limited to, electrical and heat insulation, paint filler, reinforcing agents in rubber and plastics (e.g., tile mastic), and cement reinforcement.

Attenuation – The process by which a compound is reduced in concentration over time, through absorption, adsorption, degradation, dilution, and/or transformation. Can also be the decrease with distance of sight caused by attenuation of light by particulate pollution.

Audit – 1. An examination of records or financial accounts to check their accuracy. 2. An adjustment or correction of accounts. 3. An examined and verified account.

B

Background radiation – Relatively constant low-level radiation from environmental sources such as building materials, cosmic rays, and ingested radionuclides in the body.

Basin – 1. A low-lying area, wholly or largely surrounded by higher land, that varies from a small, nearly enclosed valley to an extensive, mountain-rimmed depression. 2. An entire area drained by a given stream and its tributaries. 3. An area in which the rock strata are inclined downward from all sides toward the center. 4. An area in which sediments accumulate.

Best management practice – The preferred methods and practices for managing operations.

Biological niche – A role played by a species in the environment.

Biota – The animal and plant life of a given region.

Borehole – A hole created or enlarged by a drill or auger. Also known as drill hole.

C

Catchment basin – The geographical area draining into a river or reservoir.

Cesium-137 – A radioactive isotope of cesium used in radiation therapy.

Commercial solid waste –Includes all types of solid waste generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities,

excluding residential, household and industrial wastes. At SNL, such waste includes office trash, packaging material, empty containers, cardboard, newspaper, broken glass, and food debris.

Coniferous Forest – A type of forest characterized by cone-bearing, needle-leaved trees

Containment – An enclosed space or facility to contain and prevent the escape of hazardous material.

Containment cell – An engineered structure designed to contain and prevent the migration of hazardous waste.

Contamination – Introduction into water, air, and soil of microorganisms, chemicals, toxic substances, wastes, or wastewater in a concentration that makes the medium unfit for its next intended use. Also applies to surfaces of objects, buildings, and various household and agricultural use products.

Corrective action – 1. EPA can require treatment, storage and disposal (TSDF) facilities handling hazardous waste to undertake corrective actions to clean up spills resulting from failure to follow hazardous waste management procedures or other mistakes. The process includes cleanup procedures designed to guide TSDFs toward in spills. 2. An action identified to correct a finding that, when completed, fixes the problem or prevents recurrence.

D

Decontamination – Removal of harmful substances such as noxious chemicals, harmful bacteria or other organisms, or radioactive material from exposed individuals, rooms and furnishings in buildings, or the exterior environment.

Demolition – The act or process of wrecking or destroying, especially destruction by explosives.

Discharge – Any liquid or solid that flows or is placed on or onto any land or into any water. This includes precipitation discharges to the storm drains, accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of any material or substance on or into any land or water.

Discharge Limits – The maximum concentration of a specified pollutant allowed to be discharged in a volume of water or wastewater.

Discharge point – The site or location of a release, flow or runoff of any waste governed by regulation.

Diurnal – 1. Relating to or occurring in a 24-hour period; daily. 2. Occurring or active during the daytime rather than at night: diurnal animals.

Dosimeter – A device used to measure the dose of ionizing radiation received by an individual.

Drawdown – 1. The drop in the water table or level of water in the ground when water is being pumped from a well. 2. The amount of water used from a tank or reservoir. 3. The drop in the water level of a tank or reservoir.

E

Ecology – The relationship of living things to one another and their environment, or the study of such relationships.

Ecosystem – The interacting system of a biological community and its non-living environmental surroundings.

Effective dose equivalent (EDE) – The weighted average of dose equivalents in certain organs or tissues of the body; this can be used to estimate the health-effects risk of the exposed individual.

Effluent – Wastewater--treated or untreated--that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Electroplating – To coat or cover with a thin layer of metal by electrodeposition.

Environment – The sum of all external conditions affecting the life, development and survival of an organism.

Environment, Safety and Health (ES&H) – A program designed to protect and preserve the environment and to ensure the safety and health of its employees, contractors, visitors, and the public.

Environmental Assessment (EA) – An environmental analysis prepared pursuant to the National Environmental Policy Act (NEPA) to determine whether a federal action would significantly affect the environment and thus require a more detailed environmental impact statement.

Environmental Management – A program designed to maintain compliance with EPA, state, local and DOE requirements.

Environmental Management System – A continuing cycle of planning, evaluating, implementing, and improving processes and actions undertaken to achieve environmental goals.

Environmental Monitoring -- The collection and analysis of samples or direct measurements of environmental media such as air, water, and soil.

Environmental Impact Statement (EIS) – A document required of federal agencies by the National Environmental Policy Act for major projects or legislative proposals significantly affecting the environment. A tool for decision making, it describes the positive and negative effects of the undertaking and cites alternative actions.

Environmental Restoration – A project chartered with the assessment and, if necessary, the remediation of inactive waste sites.

Environmental restoration (ER) site – Any location listed on the environmental restoration (ER) site list that has been identified as an area that is (or may be) contaminated-either on or beneath the land surface-as a result of SNL operations. Contaminants may be chemicals, radioactive material, or both.

Environmental Surveillance – A program including surveys of soil and vegetation, water sampling and analysis, in an attempt to identify and quantify long-term effects of pollutants resulting from SNL operations.

Ephemeral Stream – A stream channel which carries water only during and immediately after periods of rainfall or snowmelt.

Exceedance – Violation of the pollutant levels permitted by environmental protection standards.

Explosive waste – Any explosive substance, article, or explosive-contaminated item that cannot be used for its intended purpose and does not have a legitimate investigative or research use.
Examples include:

- Unstable explosive substances or articles
- Wipes, filters, or debris contaminated with explosives
- Scraps, cuttings, chips, fines, etc. from plastic, composite, or sheet explosives
- Explosives dissolved in solvents
- Damaged or misfired explosive articles
- Small quantities of bulk explosives, pyrotechnics, and propellants for which there are no known reapplication uses

Any of the above examples that have an investigative or research use are not waste until the owner determines that there is no further legitimate need or use for them.

F

Fault – A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are displaced relative to one another and parallel to the plane of fracture.

Fauna – 1. Animals, especially the animals of a particular region or period, considered as a group. 2. A catalog of the animals of a specific region or period.

Flora – 1. Plants. 2. The plant life characterizing a specific geographic region or environment.

Flow channel – the part of a stream bed that is occupied by water under normal flow conditions

G

Geology – The scientific study of the origin, history, and structure of the earth.

Groundwater – The supply of fresh water found beneath the Earth's surface, usually in aquifers, which supply wells and springs. Because ground water is a major source of drinking water, there is growing concern over contamination from leaching agricultural or industrial pollutants or leaking underground storage tanks.

H

Hazardous substance – 1. Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive. 2. Any substance designated by EPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or is otherwise released into the environment.

Hazardous waste – Waste that meets any of the following conditions:

- On analysis, exhibits any of the characteristics of a hazardous waste as defined in 40 CFR 261 Subpart C.
- Has been named as a hazardous waste and is listed as such in 40 CFR 261 Subpart D.
- A mixture containing a listed hazardous waste and a nonhazardous solid waste.
- A waste derived from the treatment, storage, or disposal of a listed hazardous waste.
- Is not excluded from regulation as a hazardous waste.
- Defined as hazardous waste by specific state regulations.

Hazardous waste landfill – An excavated or engineered site where hazardous waste is deposited and covered.

Hazardous waste site – Any facility or location at which hazardous waste operations take place.

Herbicides – A chemical pesticide designed to control or destroy plants, weeds, or grasses.

High-level radioactive waste (HLW) – Waste generated in core fuel of a nuclear reactor, found at nuclear reactors or by nuclear fuel reprocessing; is a serious threat to anyone who comes near the waste without shielding.

Hydrology – The science dealing with the properties, distribution, and circulation of water.

I

Illicit discharges – The absolute prohibitions against the release of certain substances.

Implementation plan (IP) – The plan developed by the Operational Readiness Review (ORR) or Readiness Assessment (RA) team that describes the specifics of approach, schedule, methodology, team members and their qualifications, and reporting requirements of the ORR or RA. The Implementation Plan (IP) is used by the team leader to execute the ORR or RA.

Industrial discharges – The absolute prohibitions against the release of certain substances.

Inertial-confinement fusion – A method of controlled fusion in which the rapid implosion of a fuel pellet, produced by laser, electron, or ion beams, raises the temperature and density of the pellet core to levels at which nuclear fusion can take place before the pellet flies apart.

Infiltration – 1. The penetration of water through the ground surface into sub-surface soil or the penetration of water from the soil into sewer or other pipes through defective joints, connections, or manhole walls. 2. The technique of applying large volumes of waste water to land to penetrate the surface and percolate through the underlying soil.

Inhalation hazard – Risk from materials or chemicals that present a hazard if respired (inhaled) into the lungs.

Insecticides – A pesticide compound specifically used to kill or prevent the growth of insects.

Integrated Safety Management System – Systematically integrates safety into management and work practices at all levels so that missions are accomplished while protecting the worker, the public, and the environment.

L

Lagoons – 1. A shallow pond where sunlight, bacterial action, and oxygen work to purify wastewater; also used for storage of wastewater or spent nuclear fuel rods. 2. Shallow body of water, often separated from the sea by coral reefs or sandbars.

Landfill – 1. Sanitary landfills are disposal sites for non-hazardous solid wastes spread in layers, compacted to the smallest practical volume, and covered by material applied at the end of each operating day. 2. Secure chemical landfills are disposal sites for hazardous waste, selected and designed to minimize the chance of release of hazardous substances into the environment.

Leachate – Water that collects contaminants as it trickles through wastes, pesticides or fertilizers. Leaching may occur in farming areas, feedlots, and landfills, and may result in hazardous substances entering surface water, ground water, or soil.

Leached – The process by which soluble constituents are dissolved and filtered through the soil by a percolating fluid.

Legacy contamination – Contamination that remains after facilities, operations or activities that created it have gone out of existence or ceased, often resulting in an orphan site in need of remediation.

Line Management – The process of managing workers through individual Integrated Job Structure assignments (i.e., work titles) and contractor positions that support SNL's mission core processes and enabling processes.

Long-term Environmental Stewardship – Activities necessary to maintain long-term protection of human health and the environment from hazards posed by residual radioactivity and chemically hazardous materials.

Low-Level Radioactive Waste (LLW) – Wastes less hazardous than most of those associated with a nuclear reactor; generated by hospitals, research laboratories, and certain industries. The Department of Energy, Nuclear Regulatory Commission, and EPA share responsibilities for managing them.

Low Temperature Thermal Desorption (LTTD) – A process of removing organic compounds from soil by heating it and causing the organics to volatilize and/or decompose. The volatilized compounds may be further degraded by after burning or catalysis.

M

Maximally exposed individual (MEI) – The location of a member of the public which receives or has the potential to receive the maximum radiological dose from air emissions of a National Emissions Standards for Hazardous Air Pollutants (NESHAP) radionuclide source.

Members of the Workforce – For purposes of CPR400.1.1/MN471001, ES&H Manual, and its supplements, Members of the Workforce are: Sandia employees and contractor employees as specified in CPR400.1.1/MN471001, ES&H Manual, Section 1B, "What Is the Scope."

Migratory birds – All birds listed within the Migratory Bird Treaty Act, 50 CFR 10.13, or which are a mutation or hybrid of any such species, including any part, nest, or egg.

Mixed Low-Level Waste (MLLW) – Waste containing both hazardous and low-level radioactive components. Mixed waste – Radioactive waste that contains both source material, special nuclear material, or by-product material subject to the Atomic Energy Act of 1954, as amended; and a hazardous component subject to the Resource Conservation and Recovery Act (RCRA), as amended.

Mixed waste generator – Any person or organization generating mixed waste or causing a material to be subject to mixed waste regulations. Generators are responsible for the generation and subsequent management of mixed waste as part of their occupation or position. Generators may include managers, their employees, and contractors.

N

National Emissions Standards for Hazardous Air Pollutants (NESHAPS) – Emissions standards set by EPA for an air pollutant not covered by NAAQS that may cause an increase in fatalities or in serious, irreversible, or incapacitating illness. Primary standards are designed to protect human health, secondary standards to protect public welfare (e.g. building facades, visibility, crops, and domestic animals).

National Environmental Policy Act (NEPA) – The basic national charter for protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy.

National Pollutant Discharge Elimination System (NPDES) – A provision of the Clean Water Act which prohibits discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, or, where delegated, a tribal government on an Indian reservation.

Natural resources – Resources (actual and potential) supplied by nature.

Nitrates – A compound containing nitrogen that can exist in the atmosphere or as a dissolved gas in water and which can have harmful effects on humans and animals. Nitrates in water can cause severe illness in infants and domestic animals. A plant nutrient and inorganic fertilizer, nitrate is found in septic systems, animal feed lots, agricultural fertilizers, manure, industrial waste waters, sanitary landfills, and garbage dumps.

Nitrites – 1. An intermediate in the process of nitrification. 2. Nitrous oxide salts used in food preservation.

Nitrogen Dioxide – A poisonous brown gas, NO2, often found in smog and automobile exhaust fumes and synthesized for use as a nitrating agent, a catalyst, and an oxidizing agent.

Non-Methane Hydrocarbon (NMHC) – The sum of all hydrocarbon air pollutants except methane; significant precursors to ozone formation.

Non-radiological Contaminants – A source of contamination that has no radiological components.

Nuclear energy – The energy released by a nuclear reaction.

Nuclear particle acceleration – Imparting large kinetic energy to electrically charged sub-atomic nuclear particles (e.g., protons, deuterons, electrons) by applying electrical potential differences for the purpose of physics experiments.

O

Outfalls – The place where effluent is discharged into receiving waters.

Overland surface flow – A land application technique that cleanses waste water by allowing it to flow over a sloped surface. As the water flows over the surface, contaminants are absorbed and the water is collected at the bottom of the slope for reuse.

Ozone – A colorless gas (O3) soluble in alkalis and cold water; a strong oxidizing agent; can be produced by electric discharge in oxygen or by the action of ultraviolet radiation on oxygen in the stratosphere (where it acts as a screen for ultraviolet radiation).

P

PM10 – Particulate matter (diameter equal to or less than 10 microns)

PM2.5 – Respirable particulate matter (diameter equal to or less than 2.5 microns)

Passive soil vapor – Used in the context of soil gas sampling by placing a porous material into contact with the soil. Gases present in the soil will adsorb to the material. The porous material is removed from the soil after a sufficient time of exposure and sent to a laboratory for analysis of the adsorbed gases.

Perched groundwater – Groundwater that is unconfined and separated from an underlying main body of groundwater by an unsaturated zone (also known as perched water).

Perennial spring – A spring that flows continuously, as opposed to an intermittent spring or periodic spring.

Physiography – The study of the natural features of the earth's surface, especially in its current aspects, including land formation, climate, currents, and distribution of flora and fauna (also called physical geography).

Piezometer – An instrument for measuring pressure, especially high pressure.

Point Source – A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g. a pipe, ditch, ship, ore pit, factory smokestack.

Point source discharges – Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged.

Pollutant – Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.

Pollutant, water – Defined by the Environmental Protection Agency (EPA) as any physical, chemical, biological, or radiological substance that has an adverse affect on water.

Pollution Prevention (P2) – The use of materials, processes, and practices that reduce or eliminate the generation and release of pollutants, contaminants, hazardous substances, and waste into land, water, and air. For DOE, this includes recycling.

Polychlorinated biphenyls – PCB" and "PCBs" are chemical terms limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances that contains such substance. Because of their persistence, toxicity, and ecological damage via water pollution, their manufacture was discontinued in the U.S. in 1976.

Potable Water – Water free from impurities present in quantities sufficient to cause disease or harmful physiological effects.

Practical quantitation limit (PQL) – The lowest level of analytical determination that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

Pulsed power – Technology is used to generate and apply energetic beams and high-power energy pulses.

Q

Quality Assurance – A system of procedures, checks, audits, and corrective actions to ensure that all EPA research design and performance, environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality.

R

Radiation-generating device (RGD) – Collective term for devices which produce ionizing radiation, sealed sources which emit ionizing radiation, small particle accelerators used for single purpose applications which produce ionizing radiation (e.g., radiography), and electron-generating devices that produce x-rays incidentally.

Radioactive waste – Any waste that emits energy as rays, waves, streams or energetic particles. Radioactive materials are often mixed with hazardous waste, from nuclear reactors, research institutions, or hospitals.

Radiological Contaminants – Radioactive material deposited in any place where it is not desired, particularly where its presence may be harmful.

Radionuclide – Radioactive particle, man-made (anthropogenic) or natural, with a distinct atomic weight number. Can have a long life as soil or water pollutant.

Radon – A colorless naturally occurring, radioactive, inert gas formed by radioactive decay of radium atoms in soil or rocks.

Reportable quantity (RQ) – Quantity of material or product compound or contaminant which when released to the environment is reportable to a regulatory agency.

Rodenticides – A chemical or agent used to destroy rats or other rodent pests, or to prevent them from damaging food, crops, etc.

S

Sample Management Office – An SNL office that manages environmental analytical laboratory contracts and assists with the processing and tracking of samples undergoing chemical and radiochemical analyses performed at these laboratories.

Sampling plan – A plan stating sample sizes and the criteria for accepting or rejecting items or taking another sample during inspection of a group or items.

Sanitary discharges – The portion of liquid effluent exclusive of industrial wastewater and storm water. The liquid discharges from rest rooms and food preparation activities.

Screened intervals – The section of water well piping below ground that is perforated or in some manner made porous to allow water to enter the interior of the casing and prohibit the entry of sand and rocks.

Seasonal recharge – Recharge of groundwater during and after a wet season, with a rise in the level of the water table.

Secondary containment – Any structure or device that has been installed to prevent leaks, spills, or other discharges of stored chemicals, waste, oil, or fuel from storage, transfer, or end-use equipment from being released to the environment. Examples of secondary containment include pans, basins, sumps, dikes, berms, or curbs.

Semi-confined aquifer – An aquifer partially confined by soil layers of low permeability through which recharge and discharge can still occur.

Semi-volatile organic compounds – Organic compounds that volatilize slowly at standard temperature (20 degrees C and 1 atm pressure).

Solid waste – Any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities.

Sieve – A utensil of wire mesh or closely perforated metal, used for straining, sifting, ricing, or puréeing.

Statement of Work – A comprehensive description of the goods, services, or combination of goods and services for which SNL contracts.

Storm water – Water runoff from rainfall or snowmelt, including that discharged to the sanitary sewer system.

Sulfur Dioxide – A colorless, extremely irritating gas or liquid, SO2, used in many industrial processes, especially the manufacture of sulfuric acid.

Surface discharge – Spilling, leaking, pumping, pouring, emitting, emptying, or dumping into water or in a location and manner where there is a reasonable probability that the discharged substance will reach surface or subsurface water.

SWEIS – Site-Wide Environmental Impact Statement – A detailed public document, for which a federal agency is responsible, that provides analysis of the expected impacts on the human environment of a proposed action and alternatives to the proposed action.

T

Thermoluminescent Dosimeters – A device that monitors both the whole body and skin radiation dose to which a person has been exposed during the course of work. These same devices can also be used to measure environmental exposure rates.

Threatened and endangered species – A species present in such small numbers that it is at risk of extinction.

Time-weighted composites – A sample consisting of several portions of the user's discharge collected during a 24-hour period in which each portion of the sample is collected with a specific time frame that is irrespective of flow.

Topography – The physical features of a surface area including relative elevations and the position of natural and man-made (anthropogenic) features.

Transuranic waste (TRU) – Radioactive waste containing alpha-emitting radionuclides having an atomic number greater than 92, and a half-life greater than 20 years, in concentrations greater than 100 nCi/g.

Trihalomethanes – A chemical compound containing three halogen atoms substituted for the three hydrogen atoms normally present in a methane molecule. It can occur in chlorinated water as a result of reaction between organic materials in the water and chlorine added as a disinfectant.

Tritium – A radioactive hydrogen isotope with atomic mass 3 and half-life 12.5 years, prepared artificially for use as a tracer and as a constituent of hydrogen bombs.

Toxic (chemicals) – Any chemical listed in EPA rules as "Toxic Chemicals Subject to Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986."

Turbidity – 1. Haziness in air caused by the presence of particles and pollutants. 2. A cloudy condition in water due to suspended silt or organic matter.

U

USFS (U.S. Forest Service) Withdrawn Area – A portion of Kirtland Air Force Base consisting of land within the Cibola National Forest, which has been withdrawn from public access for use by the US Air Force and the US Department of Energy.

Unconsolidated basin sediment – 1. A sediment that is loosely arranged or unstratified, or whose particles are not cemented together, occurring either at the surface or at depth. 2. Soil material that is in a loosely aggregated form.

Underground storage tank (UST) – A single tank or a combination of tanks, including underground pipes connected thereto, which are used to contain an accumulation of regulated substances, such as petroleum products, mineral oil, and chemicals, and the volume of which, including the volume of underground pipes connected thereto, is 10% or more beneath the surface of the ground.

Up-gradient – In the direction of higher water levels.

Upstream – In, at, or toward the source of a stream.

Uranium – A heavy silvery-white metallic element, radioactive and toxic, easily oxidized, and having 14 known isotopes of which U 238 is the most abundant in nature. The element occurs in several minerals, including uraninite and carnotite, from which it is extracted and processed for use in research, nuclear fuels, and nuclear weapons.

V

Vadose Zone – The zone between land surface and the water table within which the moisture content is less than saturation (except in the capillary fringe) and pressure is less than atmospheric. Soil pore space also typically contains air or other gases. The capillary fringe is included in the vadose zone.

Vanadium – A bright white, soft, ductile metallic element found in several minerals, notably vanadinite and carnotite, having good structural strength and used

in rust-resistant high-speed tools, as a carbon stabilizer in some steels, as a titanium-steel bonding agent, and as a catalyst.

Volatile Organic Compound (VOC) – Any organic compound that participates in atmospheric photochemical reactions except those designated by EPA as having negligible photochemical reactivity.

W

Waste Characterization – Identification of chemical and microbiological constituents of a waste material.

Waste Management – The processes involved in dealing with the waste of humans and organisms, including minimization, handling, processing, storage, recycling, transport, and final disposal.

Wastewater – The spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter. Water Pollution: The presence in water of enough harmful or objectionable material to damage the water's quality.

Water-bearing strata – Ground layers below the standing water level.

Watershed – The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point.

Water table – The level of groundwater.

Wetland – An area that is saturated by surface or ground water with vegetation adapted for life under those soil conditions, as swamps, bogs, fens, marshes, and estuaries.

Wind rose – A wind rose is a graphical presentation of wind speed and direction frequency distribution.

UNLIMITED RELEASE DISTRIBUTION

U.S. Department of Energy/NNSA (20) (15 books/5 CDs)
Sandia Site Operations (SSO)
Office of Oversight and Assessments
Attn: Karen Agogino
P.O. Box 5400
Albuquerque, NM 87185-5400

U.S. Department of Energy/HQ (3)
Office of Air, Water, and Radiation (EH-41)
Attn: Ross Natoli
1000 Independence Ave. SW
Washington, DC 20585

U.S. Department of Energy/HQ (1)
Deputy Assistant Secretary For Facilities
Attn: Glenn Podonsky
EH-2/270 CC
1000 Independence Ave. SW
Washington, DC 20585

U.S. Department of Energy/HQ (1)
Director Office of Scientific and Technical Information (SC-33)
Attn: Walter Warnick
19901 Germantown Road
Germantown, MD 20874

U.S. Department of Energy/HQ (1)
Deputy Assistant Secretary for Office of Corporate Safety and Assurance (EH-2)
Attn: Ray Hardwick
1000 Independence Ave. SW
Washington, DC 20585

John Dietrich (1)
Lockheed-Martin Corporation
6801 Rockledge Drive
Mail Stop DM315
Bethesda, MD 20817

U.S. Department of Energy/HQ (2)
Office of Engineering (EM-22)
Attn: James Fiore
19901 Germantown Road
Germantown, MD 20874

New Mexico Environment Department (2)
Hazardous Waste Bureau
Attn: John Kieling
2905 Rodeo Park Rd. E Bldg. 1
Santa Fe, New Mexico 87505

Environmental Protection Agency (1)
Headquarters Office
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Steve Rohrer (1)
Lovelace Respiratory Research Institute
2425 Ridgecrest Drive SE
Albuquerque, NM 87108-5127

John Pike (1)
2050 Wyoming Blvd. SE
377 SPTG/CEVQ
Kirtland AFB, NM 87117-5270

Brent A. Pulsipher (1)
Pacific Northwest National Laboratory
902 Battelle Blvd.
P.O. Box 999 / MS K5-12
Richland, WA 99352

Jim Piatt, Director (1)
Isleta Environment Department
P.O. Box 1270
Isleta, NM 87022

Albuquerque City Environmental Health Department (1)
1 Civic Plaza NW
Albuquerque, NM 87102

U.S. Department of Energy/NNSA (2)
NNSA Service Center (NNSA/SC)
Environmental Safety and Health Department
Attn: C. Soden
P.O. Box 5400
Albuquerque, NM 87185-5400

Environmental Protection Agency (1)
Region VI Office
Fountain Place 12th Floor
1445 Ross Ave., Suite 1200
Dallas, TX 75202-2733

U.S. Department of Energy/HQ (2)
Office of Facilities Management and ES&H Support (NA-117)
Attn: Richard Thorpe and Michael Thompson
19901 Germantown Road
Germantown, MD 20874

U.S. Department of Energy/NNSA (CD only)
Nevada Site Office (NSO)
Attn: Bruce Hurley
P.O. Box 98518
Las Vegas, NV 89193-8518

UNLIMITED RELEASE DISTRIBUTION *(concluded)*

U.S. Department of Energy /HQ (1)
Director Office of Environmental Projects and Operations (NA-56)
Attn: Alice Williams
1000 Independence Ave. SW
Washington, DC 20585

John Moody (1)
2050 Wyoming Blvd.
377 ABW/EMP
KAFB, NM 87117-5270

Priscilla McIntosh (1)
Congressional Information Service, Inc.
4520 East West Highway
Suite 800
Bethesda, MD 20814-3389

UNM – Valencia Campus (1)
280 La Entrada
Los Lunas, NM 87031

UNM – LANL Campus (1)
4000 University Drive
Los Alamos, NM 87544

Anderson School of Management (1)
1 University of New Mexico, MSC05 3090
Albuquerque, NM 87131-0001

College of Santa Fe (1)
1600 St. Michael's Drive
Santa Fe, NM 87505

SNL/TTR (1 disk)
Attn: Vern Hermanson
PO Box 871
Tonopah, NV 89049-0871

New Mexico Environment Department/DOE (1)
Attn: Tacy Van Cleave
DOE Oversight Bureau
Mail Stop 1396
P.O. Box 5400
Albuquerque, NM 87185-5400

U.S. Department of Energy/HQ (1)
Acting Assistant Secretary for Environment, Safety and Health (EH-1)
Attn: C. Russell H. Shearer
1000 Independence Ave. SW
Washington, DC 20585

New Mexico Environment Department/DOE (1)
Attn: John Volkerding
DOE Oversight Bureau
Mail Stop 1396
P.O. Box 5400
Albuquerque, NM 87185-5400

Vuong Trinh (1)
Lockheed-Martin Corporation
6801 Rockledge Drive
Mail Stop DM315
Bethesda, MD 20817

Dan Barkley (1 CD)
Government Information Department
Zimmerman Library-UNM
1 University of New Mexico MSC05 3020
Albuquerque, NM 87131-0001

TVI – Montoya Campus (1)
4700 Morris NE
Albuquerque, NM 87111

TVI – Main Campus (1)
525 Buena Vista SE
Albuquerque, NM 87106-4096

TVI – South Valley Campus (1)
5816 Isleta Boulevard SW
Albuquerque, NM 87105

U.S. Department of Energy /HQ (1)
Director Office of Core Technical Group
Attn: Robert Goldsmith
EM-23/Clovercleaf Building
1000 Independence Ave., S.W.
Washington, DC 20585-2040

N.W. Golchert
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

Karren Suesz (5)
DOE/SNL Community Resources Information Office
c/o Epsilon Systems Solutions
2017 Yale Blvd. SE
Albuquerque, NM 87106

SNL/NM INTERNAL DISTRIBUTION

2	(MS 0141)	A. Blumberg, 11100	1	(MS 0342)	P. Newman, 10300*
1	(MS 0165)	W. R. Keener, 3651	8	(MS 1042)	S. Salinas, 10331* (10 cds)
1	(MS 1231)	S. J. Ward, 10856	4	(MS 1042)	K. Wagner, 10331*
1	(MS 0651)	ES&H Security Record Center, 4532*	1	(MS 0651)	B. Forbes, 103211
1	(MS 0612)	M. L. O'Canna, 4532	1	(MS 1122)	G. King, 10264
1	(MS 9221)	J. Irwin, 10730	1	(MS 1042)	J. Mizner, 10331
1	(MS 0724)	L. Shephard, 6000	6	(MS 1043)	ES&H Library, 10313*
1	(MS 1183)	Norm Nitta, 54191	1	(MS 1103)	W. J. Suderman, 10339
1	(MS 0756)	P. Puissant, 6146	1	(MS 0777)	A. Villareal, 10313
1	(MS 9221)	J. Harris, 8516*	1	(MS 1042)	K. Klossner, 10331
1	(MS 0890)	C. Tolendino, 10312	1	(MS 1042)	J. Payne, 10333
1	(MS 1221)	S. Yesner, 5120	1	(MS 1087)	T. Jackson, 6146
2	(MS 0899)	Technical Library, 4536*	1	(MS 1089)	F. Nimick, 6140
1	(MS 1454)	M. L. Jones, 2712	1	(MS 1087)	M. Skelly, 6146
1	(MS 1024)	B. Boyle, 10743	1	(MS 1087)	D. Stockham, 6146
1	(MS 0890)	A. Bendure, 10312	1	(MS 1088)	D. Schofield, 6141
1	(MS 1231)	P. D. Yourick, 5120	1	(MS 1042)	R. V. Sanchez, 10331*
1	(MS 1042)	B. Bailey-White, 10331	1	(MS 1089)	D. Fate, 6147
1	(MS 1042)	L. Bayliss, 10333	1	(MS 1089)	T. Goering, 6147
1	(MS 1042)	J. M. Bonaguidi, 10333	1	(MS 0628)	P. R. Fleming, 29931
1	(MS 1042)	R. Deola, 10333	1	(MS 1024)	F. March, 10743
1	(MS 1042)	M. L. du Mond, 10333	1	(MS 1112)	D. Castillo, 10339
1	(MS 1042)	J. L. Eckstein, 10333	1	(MS 0833)	R. Hunter, 1055
1	(MS 1042)	C. H. Fink, 10333	1	(MS 1094)	C. Roma, 10333
1	(MS 1392)	W. Forston, 2915	1	(MS 1390)	J. Jarry, 29531
1	(MS 1042)	J. Guerrero, 10333	1	(MS 1151)	L. Gonzales, 10339
1	(MS 0890)	H. Herrera, 10312	1	(MS 0781)	M. Irwin, 6435
1	(MS 1042)	S. Hwang, 10331	1	(MS 1151)	A. Reiser, 10333
1	(MS 1042)	A. K. Jones, 10333	1	(MS 1183)	A. Lopez, 5419
1	(MS 1042)	S. Koss, 10331*	1	(MS 1185)	R. G. Hay, 5423
1	(MS 1042)	F. C. Lauffer, 10333	3	(MS 1313)	T. A. Wolff, 3652 *
1	(MS 1042)	M. L. Miller, 10333	2	(MS 0899)	Central Technical Files, 8944*
1	(MS 0112)	F. Figueroa, 10000	1	(MS 1037)	J. Thompson, 10330
1	(MS 1103)	T. Cooper, 10333			

NOTE: *Require published copies of this report.

This page intentionally left blank.

2005 Annual Site Environmental Report for Sandia National Laboratories
Reader Questionnaire

Our goal in providing this report is to give the public a clear understanding of the environmental activities conducted at Sandia National Laboratories, New Mexico. It is important that the information we provide is easily understood, is of interest, and communicates Sandia's efforts to protect the environment and comply with environmental regulations. Thank you for your time and effort in helping us evaluate this report.

1. Is the technical level too high? too low? just right?
2. Is the writing too concise? too wordy? just right?
3. Is the amount of detail satisfactory? ☐ Yes ☐ No
4. Are there enough photos? ☐ Yes ☐ No
5. What additional environmental topics are you interested in at Sandia National Laboratories?
6. How can we improve future reports?
7. Is the glossary useful?
8. Additional Comments:

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 676 ALBUQUERQUE NM

POSTAGE WILL BE PAID BY THE ADDRESSEE

MSC 1042
ATTN: STEPHANIE SALINAS
ENVIRONMENTAL MANAGEMENT
SANDIA NATIONAL LABORATORIES
P.O. BOX 5800
ALBUQUERQUE, NM 87185-1042